AN HBJ PUBLICATION

MAY 1985/$2.00

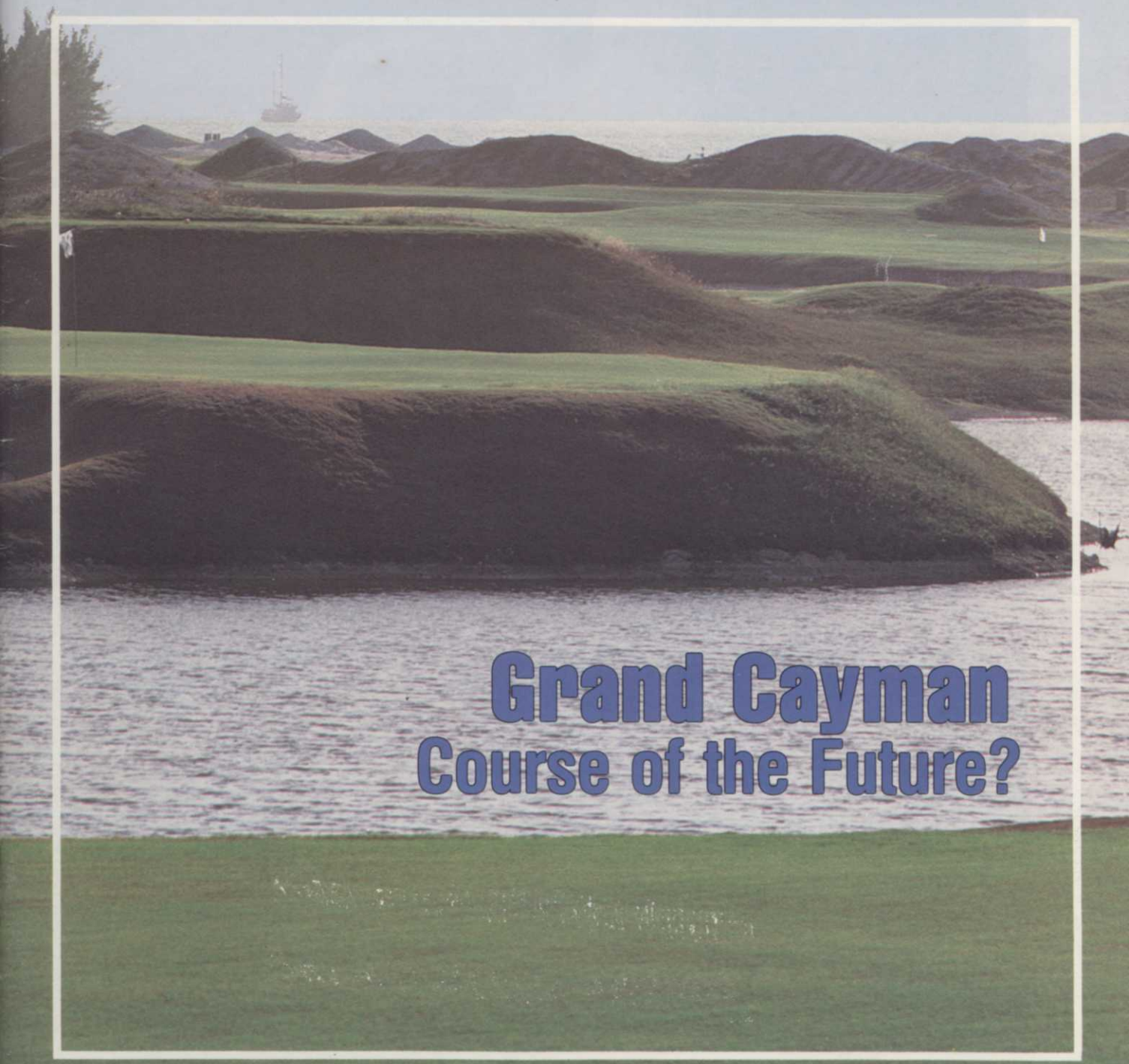
WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

Guide to Northern and Southern Insect Control

Turning on the Light in Landscapes

Hurdzan on Grand Cayman Golf—A White Elephant?



Britannia's No. 1 regulation hole and No. 2 Cayman hole

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MAY 1985 VOLUME 24, NUMBER 5

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

26 Proper Drainage Saves Money

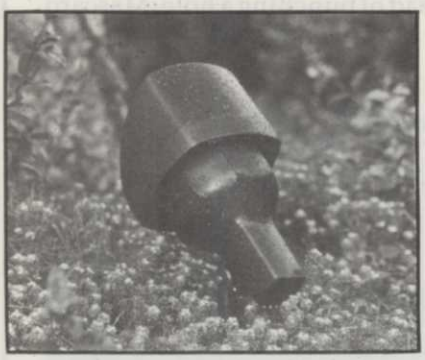
Proper attention to drainage in the initial landscape scheme is paramount to avoiding problems and increased costs down the road.

31 "Short Golf" on Grand Cayman

The world's first "short golf" course sits perched on an island in the British West Indies. Gene Bates built Jack Nicklaus' Britannia and knows only too well the challenges of building a golf course on a swamp.

35 Cayman Controversy Heats Up

Golf course architect Dr. Michael Hurdzan responds to the concept of Cayman golf. Will it revolutionize golf or is it just a way for some designers to make a quick buck?



42 Make Landscape Lighting Shine

Putting your landscape in the best possible light shouldn't be an afterthought. Well thought-out lighting can enhance plant material as well as add atmosphere and safety features to a landscape.

56 ANNUAL INSECT CONTROL GUIDE

Our popular guide to controlling insects returns, updated by Drs. Harry Niemczyk, Patricia Cobb, D.G. Nielsen and J.R. Baker. Turf and woody ornamental insect control are discussed in detail.

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NEWS/TRENDS

by **Bruce F. Shank**, executive editor

Warren's expands Sunbelt farms

Warren's isn't getting out of the sod business as Wisconsin and Ohio sod buyers might suspect after Warren's announced they are closing sod farms serving those states. They are actually beefing up their sod operation, but in the Sunbelt.

Steve McLaughlin's energy tells the story about the company's California sod operations. He increased his sales for Warren's by more than 35% in 1984 and told Weeds Trees & Turf the company is leasing more acreage in California this year.

Warren's has also added more than 1,000 acres of production in Cameron, TX, near Austin. "It is our plan to concentrate on St. Augustine first and add zoysiagrass and Adventure turf-type tall fescue later in 1985," says Earl Daniels, farm manager.

General Manager Mike Holmes says the expansion in Texas and California, "is a part of our overall strategy to concentrate our efforts into growth areas of the U.S." Emory Hunter, special products manager, said rising oil prices made the Wisconsin operation less competitive in the Chicago and Milwaukee markets.

New generation aerifier?

Tom Mascaro, one of the developers of the core-type aerifier in the 1940's, may now have a better idea, more than 40 years after his first one. It has no moving parts, cuts six- to eight-inches deep, and is set to be offered by Ransomes in the near future as an attachment to its riding mowers.

Mascaro's former company, West Point Products, developed the core-type aerifier now manufactured by Hahn. The new aerifier cuts a slit in the soil instead of punching a hole. Mascaro has successfully tested his new device on greens.

Mascaro's Second Aerifier *makes slits instead of holes and has no moving parts.*

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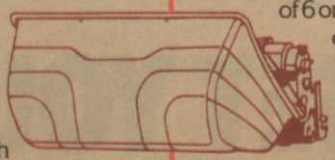

And check out these top-flight features: super-durable polyethylene/aluminum grass catchers; heavy-duty hydraulic reels; reversing reels for backlapping; handy lever selection of 3, 4 or 5 gang mowing; choice of 6 or 10 blade reels; fuel efficient 4-cylinder diesel engine; and a low maintenance design.

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More groundskeepers are finding that Roundup is helping to keep their courses looking their best and playing their best–because their crews are giving their best.

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Former students honor Dr. Bill Daniel

The Dr. Bill Daniel era at Purdue University is over and a new era begins, the recent Midwest Regional Turf Conference signaled.

Participants, many of them former students, braved blustery March weather to fete (sometimes humorously) Daniel who, during a 34-year stint in central Indiana, carved a reputation as "Mr. Turf" of the Midwest and, together with Melvin Robey, invented the Prescription Athletic Turf system in 1972.

Daniel, honored at two dinners (the first, a get-together with former students, the second a more formal affair in the Purdue Memorial Union), capped his career as an educator and researcher at Purdue. Daniel retired from that university April 30.

"He is a great mentor," says Ted Woehrle, former president of the GCSAA and Daniel's first student in 1950. "He taught me how to think and how to ask the question 'why?'."

Woehrle's comments echoed those of many former students in a bittersweet dinner at The Trails on the banks of the flood-swollen Wabash. The light-hearted affair, emceed by Dr. Jim Beard of Texas A&M, another Boilermaker grad, took on the appearance of a "Who's Who in Turf"

WT&T Executive Editor *Bruce Shank honors Daniel as "Man of the Year."*

"There were people there from all fields in the turf industry," Dr. Terry Riordan, U. of Nebraska notes. "That's just one indication of the work he's done. He's had quite an impact on my career and on the careers of many people." Dr. Riordan is one of 15 former students Daniel helped guide to Ph.Ds.

continued on page 18

New ASLA headquarters *in Washington D.C.*

ASSOCIATIONS

ASLA settles into new historic home

A four-year effort to buy an historic building in Washington D.C. paid off for the American Society of Landscape Architects (ASLA).

The ASLA recently took title to its headquarters, a turn-of-the-century townhouse, after raising $400,000 for the down payment. The Society began the drive to acquire the Victorian-style structure at 1733 Connecticut Ave. in 1980 when it signed a long-term lease with an option to purchase. In 1981, ASLA staff members began working in the extensively remodeled townhouse.

Says ASLA President Robert H. Mortensen: "All of our members can share a real sense of accomplishment." Nearly 3,000 individual members, 600 firms, and most of the ASLA chapters and some suppliers contributed to the building fund.

In 1982, the Washington Metropolitan chapter of the American Institute of Architects recognized the ASLA building for its first award for achievement of excellence in historic preservation and architectural design.

The ASLA has used its headquarters in the nation's capital to expand and consolidate its operations. The Society's staff has grown from seven to 30 in just seven years, and The Landscape Architecture Foundation is now also located at that address. Members of the Society's publishing staff, which produces the periodicals *Landscape Architecture* and *Garden Design*, moved from Louisville to the D.C. headquarters last year.

The American Society of Landscape Architects is a voluntary professional society serving the landscape architects across the country. Started in 1899 by 11 landscape architects, it now numbers over 7,000 members.

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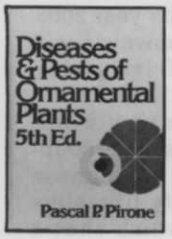

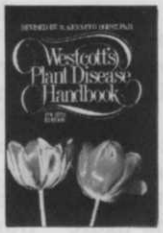

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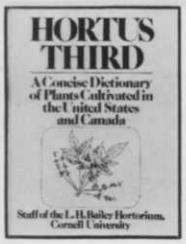

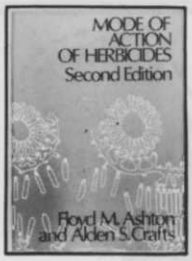

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WTT 55

INDUSTRY

Midwest next boom for irrigation

Much of the water-rich Midwest remains almost virgin territory for home irrigation systems. That could be changing in the not-to-distant future.

Representatives from Rain Bird and Toro Irrigation told attendees at the recent Reinders Turf & Irrigation Conference that irrigation will take on increased importance, even in areas where it is now uncommon, as home owners realize the value of well-maintained lawns and landscapes.

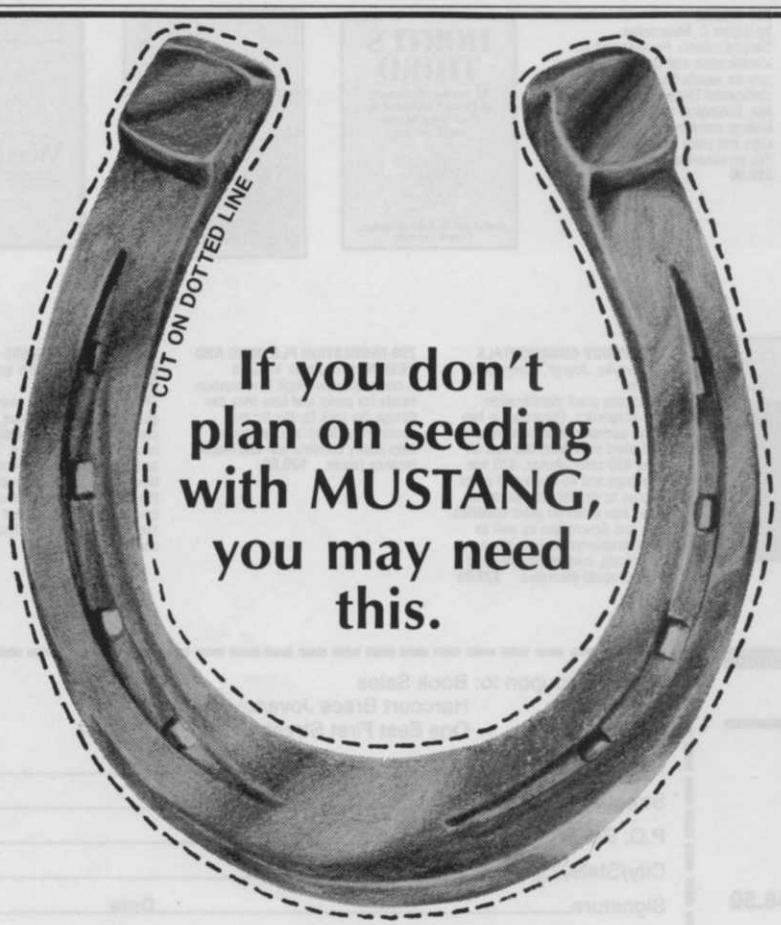
"Irrigation awareness is growing by leaps and bounds," said Don Bulmer, district sales manager of Toro Irrigation. "The growth of irrigation is staggering."

Bulmer explained that 52 percent of single family residences in Southern California possess irrigation systems, but in the Midwest the figure drops to about 3 percent.

Bulmer, pointing to the phenomenal growth in the past decade of such amenities as automobile air conditioning and central air in homes, predicted 40 to 50 percent of all homes will have irrigation by the year 2005.

Water conservation, however, will remain a concern of irrigation companies.

"Water is becoming a very scarce commodity in many parts of the country," Rain Bird's Desi Williamson added. He said products like electronic "rain checks", which shut a system down during a rain, and "moisture sensor inhibitors", which keep a system from operating until there's a need, indicate the growing sophistication of irrigation systems.



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Circle No. 145 on Reader Inquiry Card

ASSOCIATION

GCSAA outlines mid-year conference

The Hoosier Dome in Indianapolis, IN, is the site of the 1985 GCSAA Mid-Year Conference and Show. The date is Sept. 19-24.

Says GCSAA President Eugene D. Baston: "GCSAA members have expressed a need for information that will assist them in training their own staffs. With this conference, we will be answering those needs."

On the GCSAA agenda are seven education seminars, staff technician training courses, a golf/turfgrass market research workshop, a turfgrass research conference, and a national golf championship to benefit turfgrass research.

The staff technician training courses will be "hands on" with the involvement of manufacturers. They will focus on equipment repair, irrigation equipment operation, pesticide safety and applications, and golf car repair and maintenance.

In addition, 20 of the nation's leading scientists are expected to present updates on all major turfgrass research being funded with GCSAA's support.

A national "selling and buying" type exhibition trade show is planned in conjunction with the conference and an outside turfgrass equipment demonstration.

"September is an excellent time for manufacturers and distributors for golf course equipment and supplies to demonstrate their products as this is the time of the year when golf course managers plan purchases," Baston adds. "We believe this mid-year conference will be very beneficial to our members and to our advertisers and distributors."

A one-day golf championship will be played with the proceeds going to turfgrass research.

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Circle No. 106 on Reader Inquiry Card

GOVERNMENT UPDATE

Groundwater scare spreads

Concern over contamination of groundwater in New York, Florida and New Jersey is spreading to other states, the most recent being Connecticut. The Connecticut Tree Protective Association sent a legislative alert out to arborists and landscapers in late February to help counteract overzealous state lawmakers excited by recent groundwater contamination stories.

Industry members get concerned when state laws venture too far from national ones. In this case, two bills are in question. One requires monthly reports to the Connecticut Department of Environmental Protection and posting of job sites. Another would allow the state to change the classification of a pesticide regardless of Federal action.

Seed label laws come to terms

'Noxious' or 'undesirable' makes a big difference to seed companies in Pennsylvania and other Atlantic states.

Afraid of different labelling requirements for each state, people like Adikes' Bob Russell are opposed to new state seed label laws. Others, like Penn State University's Dr. Joe Duich, feel stronger laws will improve the overall image of seed from reputable companies.

The biggest problem may be the states don't talk to each other when formulating their regulations, or do they? Progress has been made through regional regulatory officials, helping change the terminology of 'noxious', required by state laws on seed labels, to 'undesirable'. But the battle is not over, even with the change in terminology. It should be a hot topic at the American Seed Trade Association meeting this summer.

Reclamation laws may fall short

When abandoned mine reclamation funds expire in 1992, thousands of acres of scarred lands will remain, according to a recent report by the Tennessee Valley Authority.

Not only are the lands scarred, but they pour nearly 2,400 tons of sediment per square mile per year into Tennessee Valley waterways alone. The TVA report states, "The abandoned mine problem will not go away; rather it will, in many cases, become more critical and costly to solve."

The Federal Reclamation laws were first implemented in 1977. They represented a great opportunity for landscape contractors, but much of this potential was lost as mining companies battled the laws in court.

TVA has developed a report, Orphans of the Valley, to describe the seriousness of reclamation laws falling short.

ASSOCIATION

Florida nurserymen seek bad check law

The Florida Nurserymen and Growers Association is pressing the state legislature there to stiffen bad check laws. If successful, the familiar refrain "the check is in the mail"—particularly if it's a bad check—might not be so common.

"From a commercial standpoint, this issue of bad checks is a big problem," Allen Bernard, executive vice president of the FNGA, tells *Weeds Trees & Turf*. "Our effort is a move to put some teeth into the law."

Current Florida law almost requires a check to be signed in front of a merchant before the drawer can be prosecuted for writing a bad check. Therefore prosecution arising from checks delivered by deliverymen or through the mail is rare. The problem of postdated checks has also caused dissatisfaction with present laws.

The FGNA is asking the legislature to rewrite the statute to allow businesses to create a check cashing card file for each customer which would include name, address, telephone number and signature of that customer. The card could be used as a basis of identification for the check writer—the main stumbling block to prosecution in the present law. Postdated checks would be eliminated as well.

"Even with these changes very few would ever be prosecuted," Bernard adds. "But the threat of prosecution might get them to pay, and that's really the intent of it all."

A draft of the FNGA proposal, which is gaining support from other non-related industries, is in legislative committee.

ATHLETIC FIELDS

Toma speaks, crowd big at Sports Institute

The Sports Turf Institute, held in March at California State Polytechnic University, Pomona, doubled in size from its inaugural meeting last year.

Show organizer Professor Kent Kurtz started with the conference last year based on requests received by the University for assistance with both professional and school fields. The first show last May attracted more than 250 field managers and 8 exhibitors. This year's show drew more than 550 field managers and 30 exhibitors. It also attracted stadium management from the Rose Bowl, San Diego Stadium, Anaheim Stadium and the Los Angeles Coliseum.

Well-known sports field expert

continued on page 84

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Circle No. 131 on Reader Inquiry Card

DANIEL *from page 8*

Although many of the students stretched their remembrances of their former professor for a chuckle, the thanks were heartfelt.

"One of the real strong points that separate him from other professors is his sincere interest in his students, even when they leave Purdue," says Charlie Tadge, superintendent of Mayfield Country Club near Cleveland and a 1958 Purdue grad. "He keeps track of his students and has helped many of us in our careers."

At a dinner in the Purdue Memorial Union the following night Bruce Shank, executive editor of *Weeds Trees & Turf* magazine, presented Daniel with the publication's "Man of the Year" Award. He is the fourth recipient of the award. Previously honored by the magazine were: Dr. Fred Grau, Monty Moncrief, and Al Radko.

Filling the void in Purdue's Department of Agronomy left by Daniel's retirement promises to be a tall order. Members of a university search committee met soon after the conference to solidify a job description for a "quality" replacement.

"We hope to attract somebody that's already out in the professional ranks," a university spokesperson, says. "We think it's an attractive enough situation to advertise at the associate professor level."

As for Daniel, looking fit and trim at the conference, retirement from academia probably means a greater involvement with the promotion and marketing of his PAT system for athletic fields.

GOLF

Fiber covers can save turf

Dr. John Roberts says golf course managers in the North should recognize fiber turf covers as a valuable "tool" in maintaining greens on their courses. They can be of particular value in the period between the spring thaw and the opening of a course for play.

Roberts of the University of New Hampshire says spun-bonded, polyester covers used on New England courses helped in four ways:

1 by reducing dessication
2 by speeding spring green-up
3 by keeping unwanted traffic off greens
4 by hastening seed germination rates by as much as 10 days.

Although several materials were tested, Roberts says the most effective seems to be a translucent material weighing one ounce and costing about five cents per sq. meter. This material (Reemay by DuPont) allows light to reach the turf, encouraging "normal" growth, he points out.

Roberts made these comments at the recent Midwest Regional Turf Conference at Purdue University.

EDUCATION

Toro funds endowment; announces competition

Good news from Toro Irrigation for the landscape industry.

Toro, through an endowment fund, is financing a course book on irrigation. The California-based company is making direct contributions totalling $50,000 over five years to the program. Interest from the fund is earmarked for use by The Landscape Architecture Foundation, Washington D.C., in putting together the irrigation reference book (in the format of the LAF "Handbook" series). Other educational materials will be funded from the endowment.

continued on page 84

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BROWN PATCH CONTROL University of Maryland, 1983

Treatment	Rate/ 1,000 Sq. Ft.	Disease Rating % Plot Area Disease 7/8
TERSAN® 1991	2 oz.	0.0
Vorlan[1]	2 oz.	5.5
Duosan[1]	3 oz.	5.0
Bayleton[2]	2 oz.	4.2
Rubigan[3]	.5 oz.	11.0
Daconil 2787 4F[4]	6 fl. oz.	4.6
Untreated	—	26.5

Bentgrass - Penncross
Application 6/7, 6/17, 7/8
R. H. Dernoden, J. D. Fry
Dept. of Agronomy, University of Maryland

ANTHRACNOSE CONTROL Michigan State University 1982
Glen Gary Golf Club, Sylvania, Ohio

Treatment	Rate/ 1,000 Sq. Ft.	Application Interval	Disease Rating % Plot Infected 8/5	8/17
TERSAN® 1991	1 oz.	21 days	8.3	0.7
Bayleton	2 oz.	30 days	11.7	1.7
Duosan	4 oz.	21 days	21.7	8.3
Clearys 3336[5]	1 oz.	21 days	30.0	18.3
Fungo 50[1]	1 oz.	21 days	28.3	19.0
Daconil 2787 4F	6 fl. oz.	14 days	38.3	28.3
Actidione TGF + Actidione RZ[6]	.34 + .55 oz.	14 days	48.3	65.0
Vorlan	1 oz.	21 days	55.0	60.0
Untreated	—	—	58.3	66.7

Annual Bluegrass
Applications began on July 7
Dr. Joseph Vargas, Michigan State University

TERSAN® 1991 controls brown patch and anthracnose better than the fungicide you are now using.

If you're not using TERSAN® 1991 fungicide you're not getting the best brown patch and anthracnose control. Test results, like these from Michigan State University on anthracnose and the University of Maryland on brown patch, prove nothing works better than Du Pont TERSAN 1991 fungicide against these two turf diseases.

Many new fungicides provide poor control of brown patch and anthracnose, especially under heavy disease pressure. Their extended spray intervals recommended for other turf diseases, such as dollar spot, are too long to provide adequate protection against brown patch and anthracnose.

TERSAN 1991 is well suited to handle the heaviest disease pressure. Its unique systemic activity withstands heavy rainfall and frequent watering for longer-lasting disease control. And TERSAN 1991 may be applied for anthracnose control either preventively or after the disease is already present.

Schedule TERSAN 1991 in your summer spray program. Apply it in tank mixtures or as supplemental applications from June through August, when brown patch and anthracnose threaten.

You'll get tee-to-green control that hits brown patch and anthracnose hard. Control that university tests prove works even under heavy disease pressure...TERSAN 1991. Only from Du Pont.

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[3] Rubigan—Elanco Products Co.
[4] Daconil—SDS Biotech Corp.
[5] Clearys 3336—W.A. Cleary Chemical Corp.
[6] Actidione TGF and Actidione RZ—TUCO Div. of Upjohn Co.

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great is what we put behind it.

two-year, 1,000 hour warranty. Simply stated, we will repair or replace any part of the mower (excluding tires, batteries and radio) which, as delivered to the purchaser, is defective in material or workmanship during the applicable period of warranty. And that includes attachments purchased with the mower. As far as we know, nobody else has a better warranty.

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Circle No. 111 on Reader Inquiry Card

IN-THE-MIDDLE

by **Bruce F. Shank**, executive editor

Scott's sets up lawn care division

A trip to last fall's Lawn Care (PLCAA) Show in Tampa was all Ron Gagne needed to recommend to Scotts management they create a special lawn care division. The advice was taken and the division was separated in March from the Pro-Turf Division.

A new group of tech reps has been assigned to deal with the 'profit-motivated' lawn care industry. "We will be offering special products and prices for the lawn care industry," says Gagne.

Target's new truck sales shine

Landscape managers in the Midwest are used to seeing Lesco's trailer show rooms at shows. So, the truck at the Cal Poly Sports Turf Institute did not strike this midwestern editor as anything unusual. That is, until I read the name on the truck, Target Chemical Co.

Target is a big factor in chemical sales to landscapers and golf courses in California, out of stores in Cerritos, San Jose, Fresno, and Phoenix. The truck was an experiment, says Lon Records, president. Target's Donna Browne said the experiment has been successful and more fifth-wheel showrooms may be coming.

When a customer sees the assortment of products in the truck they are often reminded of other things they may need. It has worked for Lesco, it can work for Target. By the way, Lesco has announced it will have its trucks roaming Palm Springs and San Diego this spring.

Toro splits North Carolina lines

The Toro Company has named East Coast Equipment, Inc., in Burlington, N.C., its consumer equipment distributor for the booming region.

E. J. Smith & Sons, Charlotte, used to have both consumer and commercial distribution in the Carolina market, but that company has neither line today. Instead, Smith Turf & Irrigation, Charlotte, a company which split away from E. J. Smith & Sons, has the commercial Toro line.

The Carolina market continues to be red hot according to Joe Porter, president of Porter Brothers, the Jacobsen dealer in the region.

Storr gives customers a good rub

Storr Tractor customers can rub their way to savings with a new rub-off coupon campaign launched in February.

The direct mail coupon campaign represents nearly $250,000 in savings for landscape and golf course equipment buyers, according to Paul Des Champs, Storr president. The Toro dealer is one of the most aggressive distributors in the New York metropolitan area.

In-the-Middle covers the turf and landscape distributor and dealer. Distributors are invited to send news items to Weeds, Trees & Turf, 7500 Old Oak Blvd., Cleveland, OH 44130.

INDUSTRY

Seed Research gets Champion registration

Champion, trademark for a blend of perennial ryegrasses from Seed Research of Oregon, Inc., recently received registration from the U.S. Department of Commerce.

The new certified mixture is used primarily by golf courses for winter overseeding in the bermudagrass region and as a permanent fairway grass from the transition zone northward. It is also being used by schools, parks, landscapers, and other professional grounds managers.

Seed Research of Oregon claims the components of Champion will vary depending upon which varieties perform best in the area of use, and that it will always contain three of the top varieties as rated by universities and golf course superintendents.

In related news, a new technical brochure on Prominent creeping bentgrass is now available, Seed Research reports.

SEED

Scotts adds services; eyes market growth

Four new services by O.M. Scott & Sons Company, Marysville, OH, are being targeted at the domestic seed trade.

This year Scotts is offering turf seed variety licensing, contract seed production, contract varietal research and development, and contract stock seed multiplication.

"These are things we've been doing for ourselves for a number of years," Bill Junk of Scotts tells *Weeds Trees & Turf*. "Now we're hoping to do it on a more major scale."

Scotts has varieties of Kentucky bluegrass, tall fescue, perennial ryegrass and St. Augustine available for licensing.

As for seed production and varietal research and development, Junk says Scotts is stressing the "custom" nature of its services. "We want ours to be a little more service oriented, tailored to meet the particular needs which exist today."

Seed production will be handled by Scotts' research personnel in Gervais, OR, who are experienced in the production of cool season grasses, while varietal research and development—for both season grasses—is available from five research stations across the country. Private varietal development will also be available through the biotechnology department at Scotts headquarters in Ohio.

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Circle No. 156 on Reader Inquiry Card

SPORTS TURF

by **Ron Hall**, assistant editor

Grounds tricks spice baseball

There's a place where a good, sneaky trick is still appreciated—the baseball diamond.

Forget about the players and the old "hidden ball" trick. Forget about the managers and their sign-stealing stratagem. An *experienced* groundskeeper might be able to win more ball games for the home team than both of them put together.

Groundskeeper Jim Anglea hinted as much this winter when he moved from the Cleveland Indians to Texas.

"I put 10 points on Julio Franco's (Cleveland shortstop) batting average," says Anglea just after moving south. "Bobby Bonds (Cleveland batting coach) told me to make the ground around home plate, about 15 feet out, hard, real hard. He said, 'Make it so hard the ball will bounce out of the Stadium.' Franco often chops the ball at the plate and got a lot of hits that way."

Roger Bossard— he babies Comiskey Park in Chicago—is one of baseball's masters of *creative* groundskeeping.

"The groundskeeper is the ball player's man, the 10th man," Roger says. "A lot of new guys haven't been taught that."

Bossard is convinced an experienced groundskeeper, tailoring a park to the personality of the home team (or exposing the weaknesses of competitors), can put extra wins on the board each season. The fun of it all, he says "is being able to get away with it without the other team finding out."

When the Chisox were loaded with sinker ball pitchers, Bossard turned the area in front of home plate into a "swamp." Forget about high hoppers over the mound. His brand of "moisture control" has also slowed visiting jackrabbits on their journeys from first to second bases.

"You take this sod lifter and put it down about three inches apart and lift the soil, and you soak it real good underneath," Bossard says almost gleefully. "It looks dry, but. . ."

Softening the power alleys in right and left centerfields gives plodding outfielders a step or two on line drives, while the skillfull drawing of the batter's box closer to the mound can give home hitters a chance to jump on a junkball pitcher before his stuff dances. Or, if the box is slyly moved back, that extra peek at a 90 mph fastball.

Subtle adjustments to the height of the pitcher's mound (both in the bullpen and on the field) has bedeviled more than a few skiddish pitchers.

"There are things done in the field that if you had false teeth, you'd drop 'em," says Bossard. "There isn't a series that goes by that something isn't done to a field to help a team."

A groundskeeper's bag of tricks is only as full as his knowledge of turf and his team, his imagination. . .and his cunning.

PEOPLE

Names in the news

North Carolina State University professor and researcher **Dr. William Gilbert** and retired golf course superintendent **Ross Taylor** received Honorary Lifetime Membership awards at the recent North Carolina Turfgrass Conference. Others recognized at the conference included **Dr. Joseph DiPaola**, assistant professor of turfgrass research at NCSU and **Charles Jordan**, USS Agri Chemicals, both receiving Outstanding Service awards, and **Dr. Glenn Burton**, Tifton, GA, winner of the Presidential Award.

The 1985 officers of the North Carolina Turfgrass Council are: **Gary Stafford**, golf course superintendent, Cardinal CC, president; **Les Kuykendall**, Porter Brothers, Inc., vice president; **Bob Tumey**, Catawba Valley Technical College, secretary; and **H. Eugene Maples**, Pine Needles Country Club, treasurer.

The New England nursery industry lost a leader with the recent death of **Cliff Corliss, Sr.**, a past president of the Massachusetts Nurserymen's Association. Corliss held plant patents for perenniels, annuals, and shrubs, and helped popularize the idea of living Christmas trees.

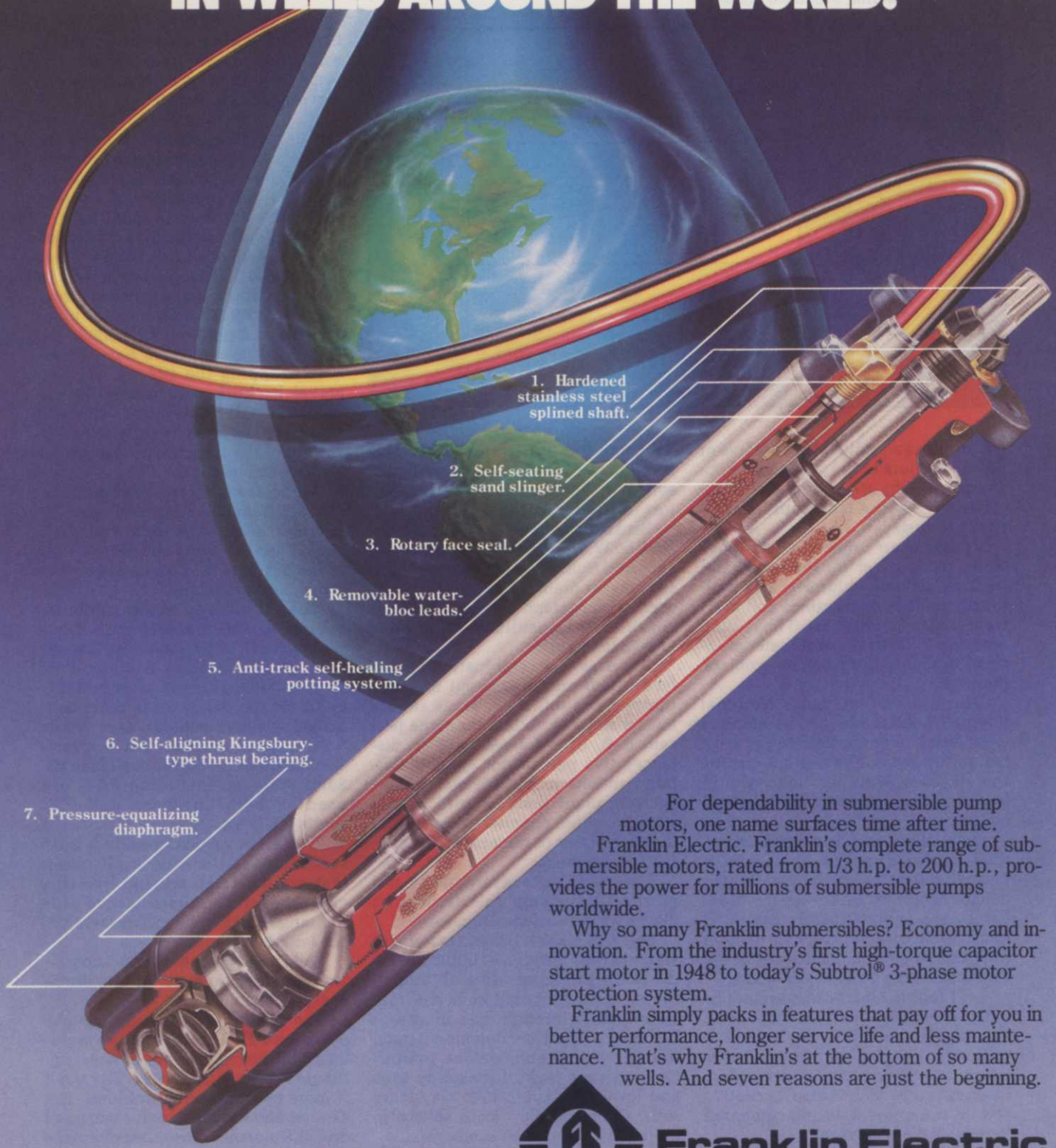
Noted golfer and golf course architect **Bill Diddel**, died Feb. 25 in Carmel, IN, at the age of 100. He designed and remodeled more than 300 courses. Diddel became involved with golf before the turn of the century and won his first tournament in 1904 before going on to win the Indiana state title five times. Among some of his better known courses are Bardmoor CC, Largo, FL; Woodlands, Carmel, IN; Speedway 500, IN; and Sunset Ridge, Northbrook, IL.

Bill Diddel

Dieter Rappsilber

Mobay announces the appointment of **Dieter Rappsilber** as director of marketing for its Agricultural Chemicals Division, which includes the Specialty Products Division. Rappsilber succeeds **Heinz Wehner**, who was recently named vice president and general manager of the Ag Division. Rappsilber has been an international marketing specialist with Bayer AG, owners of Mobay, since 1958.

SEVEN REASONS WHY 7,000,000 FRANKLIN SUBMERSIBLE MOTORS HAVE BEEN INSTALLED IN WELLS AROUND THE WORLD.



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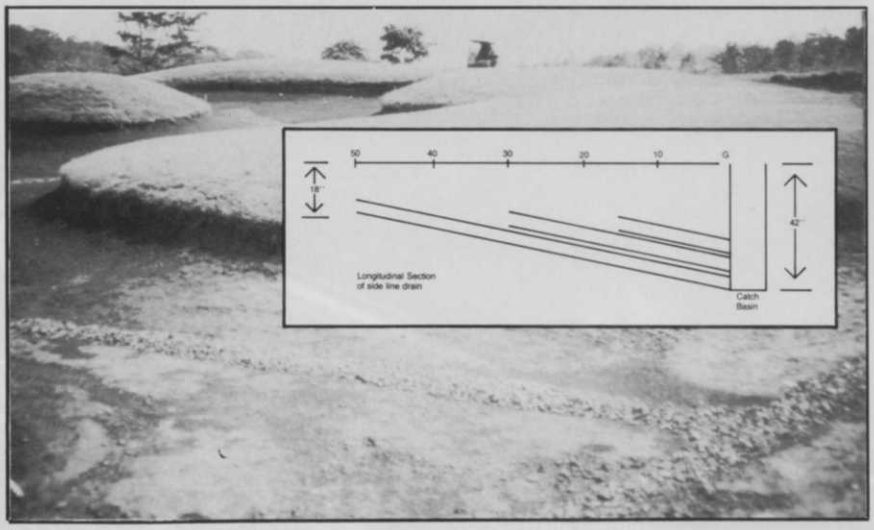
Soil Drainage: Looking at the Landscape from the Bottom Up

by **Bruce F. Shank**, executive editor



Golf bunkers *become catch basins without correct drainage. Proper slope of drain tile is necessary to move solids. (See inset).*

Drainage and soil texture are live or die matters to the greenhouse operator, yet they are treated almost incidentally by the landscape maintenance industry.

Rather than improving drainage many try to cover up the symptoms; such as disease, chlorosis, and malnutrition. They overfertilize and overtreat with fungicides. They even renovate to tolerant plant material instead of fixing the primary problem, drainage.

During a recent major National Football League playoff, helicopters were flown over the field to dry it off before the game. The copters, costing the stadium $300 per hour, would have been unnecessary had the field been properly drained.

Installation contractors will sometimes choose to ignore a drainage problem rather than lose a bid by adding the dollars necessary to do the job right. Landscape subcontractors are often forced to cut corners to get a job done on time and on budget, making up for the time and money mistakes of others.

Let's face it, all landscapes can't be built to USGA Green specifications. The plants cared for by the landscape industry are not in greenhouses where everything can be controlled. Drainage correction is also disruptive and on the expensive side compared to regular maintenance.

But, let's also admit it's easier to treat the symptoms than understand concepts like infiltration rate, percolation rate, particle size, runoff, and soil type. These concepts are all factors in landscape drainage.

Books such as *Turf Manager's Handbook* by W. H. Daniel and *Turfgrass Science and Culture* by James Beard have sections on drainage. Learn the basics even if you intend to hire a drainage consultant. Consultants have been known to disagree.

Drainage is a combination of surface runoff and movement of water through the soil. Turf areas should have a slope of no less than one percent (1 ft. drop for each 100 ft. distance), two percent for sports fields. Interruptions to surface water flow, such as plant beds. should be designed to either channel water around the obstruction or underneath by subsurface drainage.

Where surface drainage is not practical, more emphasis needs to be placed on subsurface drainage.

Soil will allow a limited amount of water to pass through it. Infiltration is the rate water enters the soil through the surface. Percolation is the rate water passes through the soil after it has entered. Both are dependent upon the soil texture and content. Infiltration rates are highest for sandy soils and lowest for compacted clay loam soils. Clay and clay loam soils also hold more water than sandy soils.

To overcome limitations with soils the landscape manager can amend the soil to increase infiltration or install drainage tile or tubing spaced 10-30 ft. apart. Daniel recommends placing the tile 3-5 ft. deep in clay and western soils and 1-2 ft. deep in sandy soils.

Tile should slope .5 to 1 percent. Tile size depends upon length. Lines under 2,000 ft. in length can be 4-in. in diameter. Six-inch tile is needed from 2,000 to 3,000 ft.; eight-inch for up to 3,500 ft.; and ten-inch for 4,500 ft.

Landscape managers have found that wrapping the tile, or tile and gravel backfill, with geotextile has provided silt protection. The tile should be elevated slightly from the bottom of the trench with pea gravel for the same reason.

Not all trenches require drain tile. Narrow trenches filled with sand or gravel also provide improved drainage. Even aerifying compacted soils is considered a drainage improvement technique.

The ultimate in drainage combines controlled soil textures with drain tile, such as United States Golf Association or Prescription Athletic Turf systems. Increased use of natural turf fields for sports has made these controlled systems popular. One sports field contractor uses USGA Green specifications for the baseball infields. Sand systems, including PAT, are used by both European and U.S. sports facilities.

The most critical problem with sand fields is the sand itself. Sands that are too small seal up like silty clay. The sand particles have to be in the range of .25 to 1.0 millimeters and not less than .1 mm.

Field managers are also incorporating more organic material into previously all-sand fields.

The average turf or landscape may not require the same drainage as an athletic field, but better drainage does contribute to overall plant vigor. The result is more efficient use of nutrients, less disease, and deeper roots for increased drought tolerance. These benefits make drainage improvements justifiable to any landscape manager. **WT&T**

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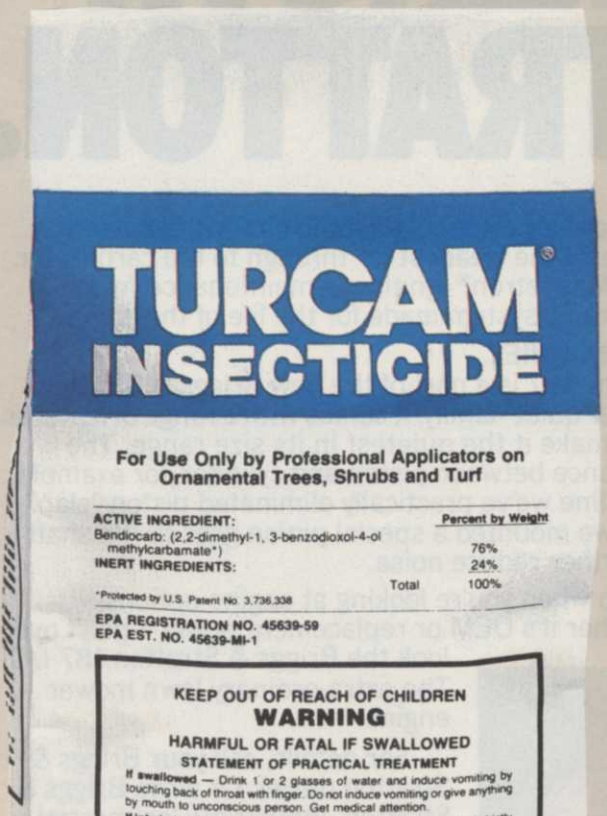

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Britannia—The Short Course Long on Appeal

by Maureen Hrehocik, managing editor

Why is the golf world focusing its attention on a golf course on a small Caribbean island? Like a phoenix, this course has risen from a rocky, tree-infested, sun-baked piece of island to become the world's first "short" course. It is turning heads as well as stirring up debate on its future in the golf industry.

Mounds dominate *the terrain at Britannia, reminiscent of Scottish courses, (top). $20,000 in brick support work, (bottom) stabilizes water hazards on the course.*

Looking out across the sun-drenched golf course, Gene Bates squints against the brightness, deepening the crow's feet in his already sun-tanned face.

In front of him sprawls Britannia—the current media darling among golf courses.

Britannia's fame is two-pronged—from its designer, Jack Nicklaus, and its design—a "short" golf course, laid out to take one quarter of the land of a traditional golf course and half the time to play with a specially-designed ball. The concept has stirred up controversy and curiosity in the traditionally conservative golf industry.

Britannia, which opened last Christmas, is actually three courses superimposed on one 38-acre parcel of land; a 9 hole, 3,180-yard par 35 championship course; an 18-hole, 3,129 yard par 60 course and the 18-hole, 3,338 yard par 72 Cayman course. Three days a week the course is devoted to Cayman golf, three days a week to the championship layout and one day a week to executive golf.

The overall 88-acre, $110 million resort, when completed, will boast a 240-room hotel, condos and golf course clubhouse.

Grand Cayman Island is a British Crown Colony, the largest of three Cayman Islands with a population of 18,000. This mecca for scuba divers and turtle lovers is located 480 miles south of Miami and 180 miles northwest of Jamaica. What was once Blackbeard's old haunt has evolved from the hub of pirateering in the 1800s to, what some conclude, is its 20th century counterpart—a tax shelter for numerous American and foreign corporations. Now, it adds

another tourist lure—the first "short" golf course."

Bates, vice president of Golforce, Nicklaus' design operation, built Britannia and knew her long before she became a "star". What stands before the builder's critical eye now is a far cry from the flat, scraggly Australian-pine-and-rock-infested hunk of land, baking under the British West Indies sun that confronted him a little more than a year ago.

"I remember thinking, 'Good God, how do we build a golf course here?' "Bates recalls of his first look at the site.

But build a golf course he did—the first on Grand Cayman Island and the first of a new breed, the "short" golf course.

Bates had only a year to transform a forgotten piece of island into the embodiment of Nicklaus' and senior designer Bob Cupp's brainchild.

Cream of wheat

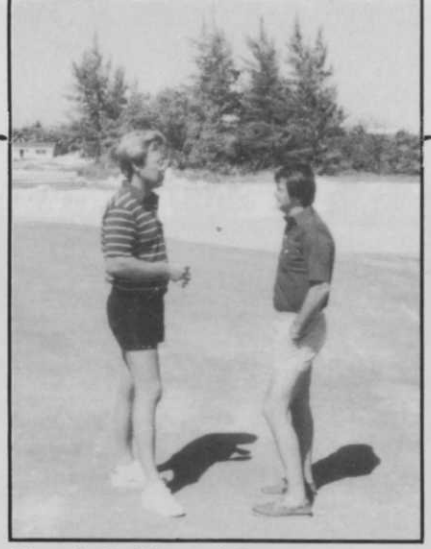
In November, 1983, crews began clearing the shrubs and pines that filled the area. Excavation was begun Dec. 1 with one large and one medium excavator and five dump trucks. (All equipment had to be shipped over from the States.) After down time around the Christmas season, it took until Feb. 15 to complete the excavation. Then, the arduous task of moving 110,000 cubic yards of dirt on only 40 acres to shape the course's features began.

"Actually, we ended up moving about 220,000 yards because of the type of material we were dealing with," explains Bates. "We moved it once to dry it and then again to shape it."

That material was a soupy "cream of wheat" consistency combination of coral, rocks, roots, limbs from an old mangrove swamp and lots of peat moss (so much peat, it still leaches tanic acid into the water hazards turning them a cinnamon color.)

"The terrain was actually one of our biggest challenges," Bates says. The land was very unstable and at an elevation of about plus 4 above sea level. We had to give the property definition. When you walked across it, it was like Jello."

The excavated swamp material was hauled up to dry, went through a cleaning and mixing process then hauled to shape the desired features, amounting to what resembles the mounding on Scottish courses. Bates, John Copeland and Jerry Cooper supervised the mounding which was planted with common bermuda, Argentine and Pensacola bermudagrass



Jimmie Griffin *and Gene Bates—superintendent and builder confer.*

and bahia and weeping lovegrass, chosen for their drought hardiness.

From the start, Bates had his work cut out for him. The original land survey done by the Caymanians was innacurate. Stakes marking reference points for greens, tees and turning points were constantly knocked over by the local contractors.

"Understanding the local mentality was, at times, difficult," concedes Bates. "You also have to be more precise building a short course because of the reduced parameters which added to the difficulty."

Twelve Caymanians were used in the initial phases of the project. Americans were brought in to do the finishing work.

A chartered DC-6 flew in Tifgreen sprigs for the greens and Tifton 419 for the tees from Tifton, GA. The banks along the lakes are covered with 159,000 square feet of Tifton 419 sod.

After five days of planting the sprigs, another setback occurred. The course's $400,000 reverse osmosis pumps used to purify the irrigation water broke.

"We lost half the tees we planted due to lack of water," says Bates.

Water is a ghost that Britannia will probably never totally shake. Annual rainfall on Grand Cayman is about 65 inches a year. All the Caribbean islands are faced with water shortages. Britannia can use a minimum of 100,000 gallons a day. Five gallons of feed water going through the reverse osmosis system will yield one gallon of useable water which is then stored in a 500,000 gallon reservoir.

The reverse osmosis pumps will hopefully stave off any severe water problems. Cayman water, at $17.58 a gallon, is cost prohibitive to use. When it does rain, the showers can be so intense for a short amount of time they cause flooding and puddling. Britannia's designers foresaw this trouble spot as well as the fact the course is close to sea level, and designed a sophisticated drainage system to get the water off the course fast. There are even drains in the grassy swales. The course is currently irrigated with a Toro Vari-Time 4000 automatic, double-row, hydraulic valve and head system.

The common bermuda fairways were ready to be mowed within three weeks of planting. Sulfur and gypsum were used to combat salt and Ph problems.

Green size, on the average, is 3,500 square feet with the smallest of 1,900 feet. The Nicklaus' design characteristic of "movement" on the greens and deep bunkers is particularly evident at Britannia.

Starting from 4 feet, Bates created 12-foot banks along one of the main water hazards. More than $20,000 in rock work stabilizes the banks of many of the waterways on the course.

Maintenance

Course superintendent Jimmie Griffin is a human cyclone. This hulk of a man seems to be everywhere at once, buzzing the course in his golf cart, inspecting work, having meetings, keeping Britannia's maintenance routine with the careful eye of a Swiss rail conductor.

"This course is a challenging, intriguing project. It's always the hardest being the 'first' of anything," he says referring to Britannia's distinction as the first course on Grand Cayman. "Most of the locals here have never even seen a golf course let alone worked on one."

He has a crew of nine Caymanians.

Greens and tees are his priority maintenance areas. The mounds on the course are not irrigated to save precious water. Where the water situation and labor present his two biggest headaches, turf disease problems give him few grey hairs.

"There's not much problem with diseases here. We take care of armyworms with Dursban and diazinon."

Rotating the course among the three playing options creates more work in setting up the markers and flags every day. Monday, Wednesday and Friday are championship layout days, Tuesday, Thursday and Saturday are Cayman golf days and Sunday is executive golf.

Shipping costs of an additional 27.5 percent inflates Griffin's $600,000-a-year maintenance budget. All his Jacobsen equipment (walking greens mower, riding triplex and hydraulic

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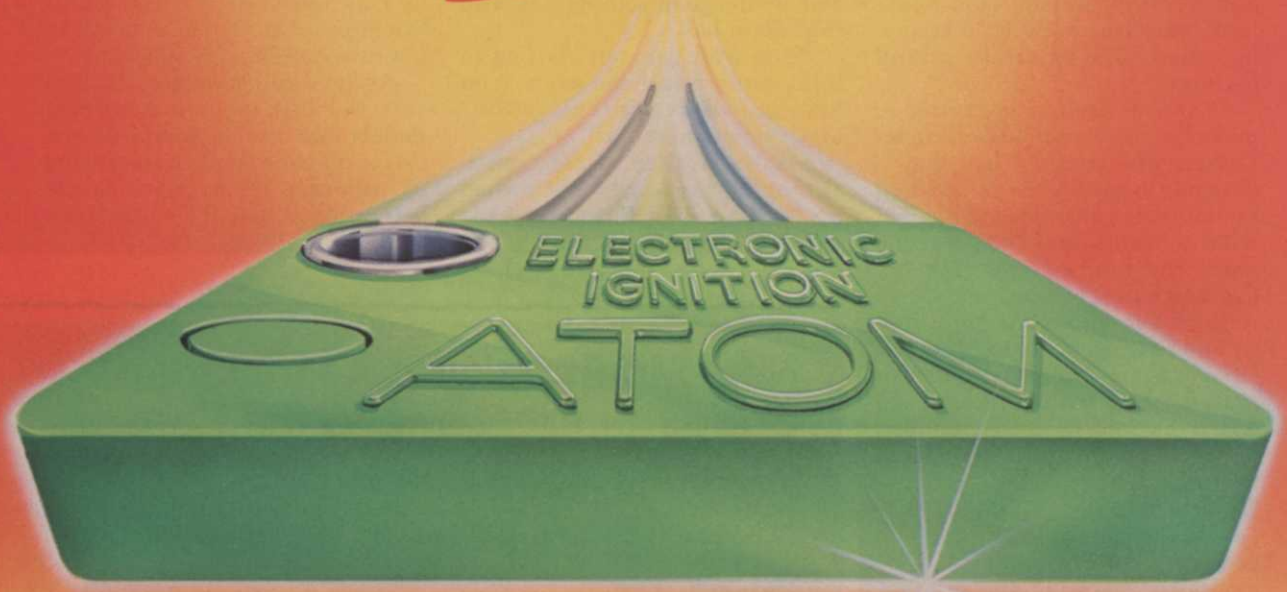

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A Golf Ball With the Midas Touch?

It looks like a regular golf ball, more or less, and that's where the resemblance ends.

The Cayman ball, the result of two years and $100,000 in research and development by Jack Nicklaus' MacGregor Golf Company, has made its debut to mixed reviews.

When everyone is trying to make the ball travel just a little bit farther, why would a ball that is designed to go only 125 yards when hit with a driver and weighs half of what a traditional ball weighs, merit the kind of attention the Cayman ball is getting?

First, a profile of the ball itself.

The Cayman ball is named after Grand Cayman Island in the British West Indies. It is on this Caribbean island that Jack Nicklaus built Britannia, the first "short" golf course designed to be played with the Cayman ball.

The Cayman ball has a bramble pattern covering made of thermoplastic material; the dimples being convex instead of concave. Both the traditional ball and Cayman are 1.68 inches in diameter, but the Cayman ball only weighs 3/4-ounce, with the traditional ball weighing in at 1.62 ounces. It's so light, it floats. (Britannia's pro Cary McGaughey's driving range is situated so the balls are driven into the North Sound. The balls float back to the shore and they're scooped up with a net.)

The ball is made by mixing a thermoplastic polymer with microscopic glass bubbles and a chemical blowing agent that is injected into the ball mold cavity.

The Cayman ball permits the "short" game to be played in 1/2 the time with 1/3 the clubs on 1/2 of the land of a traditional course.

McGaughey says a golfer can still enjoy the competitive factor and challenge of golf playing with the lighter ball.

"You find yourself starting to think more about the game. You have to look at it as enjoyment," McGaughey says.

Maurice Cullen, general manager of Britannia, which is owned by the Canadian Ellesmere Ltd., says those who have played the course "have been fascinated by the game."

"One should come and play the course and then pass judgement," he continues. "It is a marvelous teaching aid as well as a means to improve one's traditional game."

As general manager, Cullen sees the lost income from cart rentals (few people would need a cart to play the short course) being compensated for by more people being able to play the course on a reel) have to be shipped from the States. He employs his own maintenance man.

One of the touted virtues of the Cayman course is that because of its size, the way the Cayman game is played and the ball that's used, it reduces maintenance. Griffin said he's noticed less divots because "with the Cayman ball, you don't hit down on the ball; it's more of a sweeping motion."

Future plans call for more trees and vegetation to fill out the planting scheme once the course stabilizes.

Is there a minimum acreage for Cayman golf courses?

"The minimum acreage depends on whether you want a nine or 18 hole configuration, the shape of the property, and the landscape; whether it has creeks, lakes or swamps. I would say 20 acres would be the minimum for a nine-hole Cayman course and 40 acres for an 18 hole course."

Even with the pitfalls of building a golf course on an island in the Caribbean, Bates is proud of the course and of the friendships and camaraderie that grew out of the experience.

"When we started to build it seemed as if everything that could go wrong did—no rain, equipment breakdowns, labor problems, but no one was willing to accept defeat. I'm very pleased with the way the course turned out, except the water situation," says Bates. "Bob Cupp and Jack Nicklaus are the geniuses that made this thing work. They're on the same wavelength. People have been talking about building a golf course here for years, but no one was willing to try it."

Until now.

New Modified Golf Association Brings Short Game to the Fore

It was 30 years in the making, but worth the wait.

At least that's the way Florida golf course architect Bill Amick looks at it.

Amick is founder and president of the newly-formed American Modified Golf Association. Chartered in March, the non-profit association and its seven-member board of directors are dedicated to promoting and governing the short course golf concept, brought to the center of attention recently by Jack Nicklaus' new "short course," Britannia, on Grand Cayman Island and with the Cayman ball, designed to travel only half the distance of a traditional golf ball. The association is currently in a membership drive.

"We believe in what Jack is doing," says Amick.

But Amick's interest in the short game started long before the Golden Bear's Britannia was even a glimmer in its architect's eye.

"Back in the '50s I had the privilege of working with Bill Diddel on a reduced yardage, less lively ball, but we never got one that was really satisfactory," explains Amick.

They tried again in the late '70s, but came up with nothing they felt could be marketed in mass quantities.

It wasn't until Nicklaus' MacGregor company introduced the MacGregor 50 and christened it the Cayman ball, that Amick decided the time had come to get together everyone interested in the short course concept.

A seminar was held in Daytona Beach in December of last year with about 45 attendees, including representatives from the USGA,

given day. Those estimates range as high as 18 percent more players completing play per day because of the shortened playing time. Britannia's membership will be limited to condo owners, hotel guests and a few limited open memberships.

Interest in the short course concept, according to Gene Bates vice president of Golforce, Nicklaus' design operation, has been steady.

"We've had about 50 inquiries from Portland to Chicago (since Britannia opened)," he says. □

MacGregor Golf Company, Golden Bear Enterprises, golf course architects and others interested in the concept. A slate of officers was elected and three short course tournaments planned to introduce the game to the public. The first of these tournaments was held earlier this month at the Oceans golf course in Daytona Beach Shores which was a Par 3 modified to accomodate the Cayman game, with another scheduled for May 18 and the last on June 8. They will all be held in Florida.

"These tournaments, as well as introducing the game to the public, will also help us as an association, learn about the peculiarities of the game," says Amick.

Amick admits there are diehard golf purists who will never play the Cayman game.

"There will be a percentage that plays both and there will be some who will be happy to play the Cayman game exclusively because it's less intimidating."

Amick sees countless applications of the short game to Par 3 courses as well as municipal and school applications. He, personally, has had inquiries about the short course from all over the U.S. and even one from France.

"We're looking at long-term acceptance here," Amick says. "It will take awhile for people to 'find' the short game.

"It's very gratifying to me that Bill Diddel talked of this concept enthusiastically more than 30 years ago, and that it's happening today." □

The Cayman Controversy: **The Emperor's New Clothes?**

by Dr. Michael Hurdzan, president, American Society of Golf Course Architects

Let's put Cayman golf into perspective.

Is it a great idea, or just a passing novelty? As a golf course architect, I have some strong *personal* thoughts on the subject.

Before expressing my views, I would like to clearly state that the American Society of Golf Course Architects has no formal opinion on this concept, but it does strongly support any idea that helps this great game grow and flourish. An opinion poll of our members would be expected to vary as widely as one taken of any other golf-related professional organization on whether it is a good or bad idea.

Putting things into perspective means looking at historical facts and present developments, then evaluating the relative value of an idea within the context of current society. The relative worth of an idea can only be arrived at by examining what the idea "is" and "is not" and the proper weighting of its positive and negative aspects.

Let's begin by examining what this "short ball" concept "is" and "is not." The concept of:

- a reduced distance ball is *not* new.
- a reduced yardage golf course is not new.
- short ball golf is probably *not* the wave of the future.
- Cayman golf is *not* golf under USGA rules.
- short ball golf may *not* be economically viable.

However, the concept:

- *is* good for golf because of the interest and publicity it has generated.
- *is* a good teaching tool.
- *is* an alternative to golf much like a form of miniature golf.
- *is*, in my opinion, a great publicity gimmick for Grand Cayman Island, home of Britannia, Jack Nicklaus' short course.

Dr. Michael Hurdzan

Now, I will try to substantiate these facts and observations.

As I said earlier, the idea of a reduced distance golf ball is not new and originated when golf was still played with gutta percha golf balls. A small item in the Nov. 6, 1891 issue of Britain's *Golf* suggested using "hand-fives" balls that "... do not carry so far, while at the same time ... let you know when you made a clean drive. This is important for those whose space is limited, and it also enables the learner to do more driving with less walking."

A quick check of golf ball patents identified many patents for a "short" ball with the oldest being issued to a Francis Atkinson (Patent No. 456,920) of New York City in 1891; almost 100 years ago.

Some of the more notable patents since then have included balls made of sponge rubber (1922), yarn coverings (1929), and cork (1920). Of particular interest to me was Patent No. 2,364,955 issued in 1944 to the golf course architect William Diddel. Diddel, recently deceased, had earned a

Hurdzan is a partner in the design firm of Kidwell & Hurdzan, Columbus, OH.

national reputation, among other things, for shooting his age more than 1,000 times. He described how his invention could reduce the acreage for a golf course down to 15 acres. His golf ball design used butyl rubber with a filling of magnesium oxide and the ball was claimed to have the "feel of a conventional ball."

Then Joseph Gentiluomo of Schenectedy, NY, who was awarded Patent No. 3,940,145 in 1976, for a "restricted trajectory golf ball ... having a flight range of approximately one-half to one-quarter the range of regulation balls."

So you see, the idea of a short ball is not new.

Neither is the idea of a reduced yardage golf course.

The earliest of these courses were purportedly designed by sea captains back in the 1800s near port cities so they could pass the time between voyages. (Perhaps these men used the hand-fives balls described earlier.) Since that time, there have been any number of patents issued for "short" golf courses or golf facilities placed on small acreage to date.

Wave of the future?

None of these concepts has gained wide support or attention which brings me to my third "not" point; and that is short ball golf is not the wave of the future.

The reason for believing that reduced distance golf balls and limited acreage golf courses are isolated novelties is purely historical and intuitive. If these ideas have been around for nearly a century and have not caught on, why should they now?

We have always had limited space for golf in highly populated areas, and with our modern high speed transporation, open spaces are only minutes away. Besides, we are also beginning to develop more previously unused land for golf courses, such as flood plains, landfills, airport clear zones and dedicated green space closer to population centers.

My fourth point about Cayman golf not being golf under USGA rules stems purely from the yardages used to set par for golf courses. According to the USGA, those yardages are as follows:

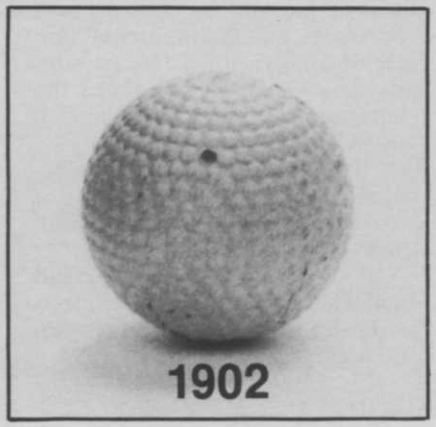
PAR	MEN	WOMEN
3	up to 250	up to 210
4	251-470	211-400
5	471 and up	401-575
6	—	576 and up

The rules of golf don't specify what kind of ball these yardages apply to so one must assume it applies to all golf balls, including the short ball. According to USGA rules, all of the Grand Cayman holes are Par 3s. It is not likely that the USGA will write new yardage rules for every new golf ball, therefore, say what you will, the Grand Cayman course is only a Par 3 course.

If we carry this logic a step further on the golf ball being able to reduce the acreage needed for golf courses, then the no hook or slice Polara golf ball may be an equal boon to golf. Afterall, area is a function of length *and* width; the short ball reduces length and the straight ball reduces width.

My last point in the "not" column deals with the possibility that the short ball course may not be economically viable.

As a dedicated golf traditionalist, I



Through the years, the golf ball has undergone many and dramatic changes. In the 1890's Game of Five balls or Hand Fives balls were used, covered in leather. In 1902, the bramble-pattern Haskell ball with gutta percha covers became popular. Wilson introduced the Pro Staff in the 1980's with truncated dimples for better resistance to wind. In 1984, the Cayman ball was introduced by the MacGregor Golf Company, weighing half the weight of a traditional ball and designed to go half the distance.

have strongly denounced the golf cart except for use by medically or physically impaired golfers, or in areas of extreme heat or slopes. The only argument that I get from golf cart supporters is "yes, you are right, but without them, we could not financially survive."

I can't believe anyone would take a cart to play short ball golf, so that represents a substantial loss of income to the course.

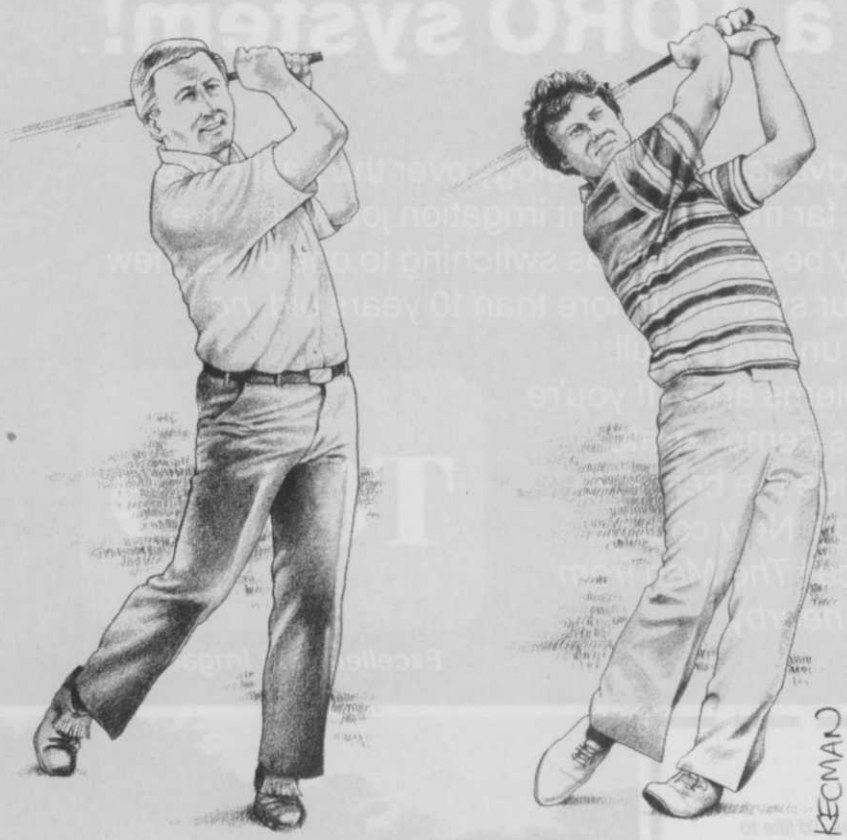
Secondly, Jack Nicklaus, designer of Britannia, the first "short" course to be built, was quoted in the June 1984 issue of *Golf Digest* magazine as saying, "A 150-acre municipal course that would normally handle 200 people in one day could handle up to 1,600 if it were designed for the short ball." His next sentence is, "the green maintenance would be less because the ball is lighter."

Now, think about that. First, the time to play golf is not a function of the cart ride between shots, it is the time that the golfer takes to find his ball, cuss, and pound his club on the ground, and then replace his divot. And since on short ball courses people are walking anyway and putting will be the same, how do you save any time? You will still be loading the golf course on seven minute intervals and I believe the playing time on a completely filled, short ball golf course will be closer to four hours than to the touted 2.5.

Afterall, area is a function of length and width; the short ball reduces length and the straight ball reduces width.

And even if you could put 500-600 people per day through a course, can you imagine what problems of spike marks and compaction you would have? Less green maintenance—not likely. What about the cost to maintain tees and bunkers? Actually the only reduction in maintenance is in fairways and roughs and then all we are doing is concentrating the divots into smaller spaces.

The parking lot to hold the cars that people come in would probably be nine or 10 acres in size.



1980

1984

Good for golf

Well, if this is what short ball is *not*, then what is it?

First, I believe it is good for golf for it has generated lots of interest and discussion about golf in non-golf publications. This extra exposure is sure to help the game. People may be tempted to try the sport simply because it is a current topic of discussion at the office, cocktail party or social gathering. There is a certain lure to try the short ball alternative to golf for no other reason than curiosity or to become the local resident expert.

The short ball idea is a great teaching tool and one that is not limited to the MacGregor golf company $2 per ball equipment either, for almost any sporting goods store carries sponge, plastic or whiffle balls for a lot less money.

But, if you can afford them, the Cayman balls would turn many a backyard into a nice driving range, (it already has at my house).

Thirdly, short ball golf is an alternative to golf much like a big version of miniature golf. It may become a novel attraction as "something to do," but it lacks the essential lure of golf and that is the thrill of seeing a well struck shot soar through the air for a few brief seconds, until it is almost out of sight.

Why else would some Japanese spend hours and hours per week on a driving range and never get to play golf. I doubt these folks would be so dedicated if all they had to hit were

continued on page 97

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... And From the Superintendent's Viewpoint

Whether you're for it or against it, the short course concept is certainly a topic that stirs up mixed reaction among superintendents across the country. Most agree in concept with the idea, but for some, doubts in other areas surface. Will a short course cut down maintenance costs? Will it be the wave of the future? Does it have a place in areas across the country? Superintendents contacted by WEEDS TREES & TURF were candid and insightful. Their observations ...

MARK KLIMM, Country Club of New Seabury, Mashpee, MA. —"I think the concept is good, but has a limited use. I know the type of clientele we have here wouldn't like it. We are part of a 2,300 acre residential condo resort development. Money and time aren't objects for the people here."

Jon Scott...*booster shot for golf.*

Willis Fuller...*certainly has its place.*

Joe Inman...*helps more than hurts.*

NEIL "BUSTER" BUSTAMANTE, Mauna Lani Resort, Kawaihae, HI — "You'd think with land being as expensive as it is in Hawaii and hard to come by, the idea would catch on here. But it hasn't and I don't think it will. I've been in the golf business 23 years in Hawaii and people come out to *play* a golf course, not a rinky-dink course. One course on Maui went from an executive course to a traditional regulation course because people want the longer course. It's hard for me to fathom the traditional golfer going into that (short course) market. Men look for distance, ladies are more finesse players. It probably does have an audience, though, among the elderly, kids and people learning how to play."

FRANK DAVITT, Allentown Municipal Golf Course, Allentown, PA — "I think there's definitely a place for it. What I'd like to see is for the course to be toughened up, not modified. I know we could use a course like that here."

BRIAN MORRIS, Silverado Country Club, Napa, CA — "Golf is too much of a traditional game for the short course idea to catch on. I think most will stick to a Par 3. Play would be limited on the shorter course because people would be playing the same fairway."

JON SCOTT, Grand Traverse Resort Village, Acme, MI — "I think it's a fantastic idea. It will be a very positive influence on the game and the number of people who play it. The primary benefit to the turf industry will be less cost; less cost to build, less cost to maintain and most likely, less cost to play. This translates directly to more golf courses, more income for the turf industry and more golf for more people, especially young people and seniors. It could just the the booster shot golf needs right now. As I understand it, the game is still played with the same clubs, skills and strategy. If the long ball hitter's ego doesn't get in the way, the short game and putting may once again be championed. A short course could be in our future here. We have two courses now, a championship course of about 7,200 yards and a 6,700-yard course. Naturally, the short game will be looked upon with great apprehension by the "purists" and I respect their concern. However, just as executive and Par 3 courses have their place in the game, so will the short ball courses."

PATRICK GREEN, World of Golf, Florence, KY — "Americans like to hit the ball hard and see it go far. I don't think the idea will catch on here. It would probably be real popular in Japan where land is so expensive. We tried the lighter balls here. People just weren't that excited about it. It's OK for the driving range, though."

WILLIS FULLER, Eufaula State Park Golf Course, Ufaula, AL — "I think the game does need to be shorter. It takes too long for most people to play now. It would relieve traffic on the longer courses. We have lots of seniors here who would rather play a short course. It's not for everybody, but it certainly has a place. With the price of chemicals and machinery, it would also help maintenance costs.

TOM FLAHERTY, Dennis Highlands, Town of Dennis, MA — "The concept is a good one, but I don't know of any club, resort or private concern that could afford to pay a superintendent the same salary he'd be getting on a larger course unless they put him in charge of the entire operation."

JOE INMAN, The Breakers, Palm Beach, FL — "It's a good concept. It's almost like another sport, though. Being a resort hotel, we're always looking for alternative sports for guests. We could fit this right into our schedule. The more you have to offer, the more you can advertise. It would also draw a lot more places into golf that may not have golf now. I don't see it as competition to the traditional game of golf or regulation, championship golf courses. It's an alternative. I've got to hand it to (Jack) Nicklaus. He's gotten everything he can out of the game and now he's trying to give something back. It's going to help the whole golf industry more than it will ever hurt it. I just wish I would had thought of it. " **WT&T**

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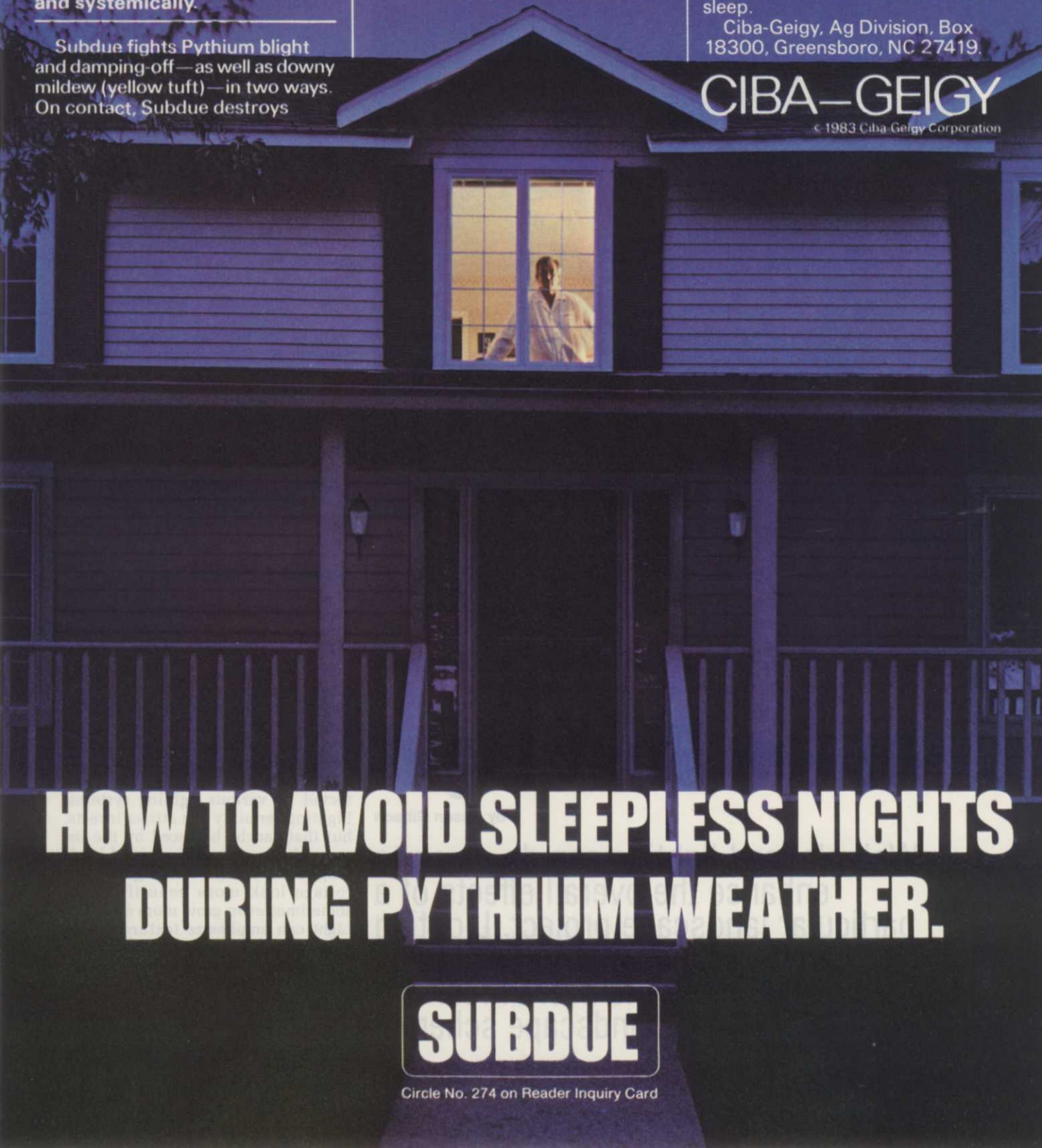

HOW TO AVOID SLEEPLESS NIGHTS DURING PYTHIUM WEATHER.

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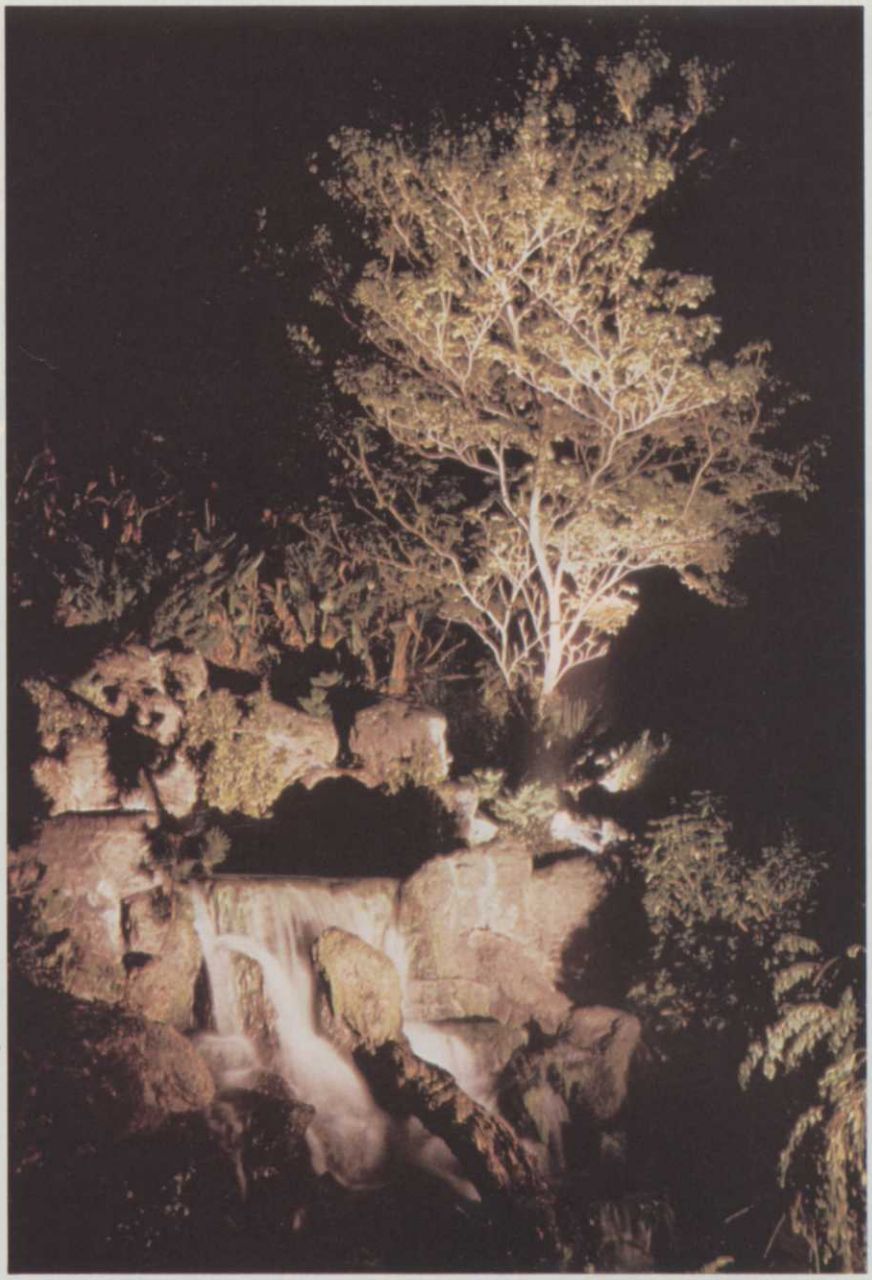

Photos courtesy of Kim Lighting, City of Industry, CA.

Striking effects *can transform landscapes into beautiful nightscapes.*

In the Best Light

by Susan Gibson

Well planned lighting can do much to enhance the overall effects of a particular landscape project. Lighting can be a functional as well as an aesthetic addition to the overall feel and look of a landscape scheme.

Good lighting can make or break a landscape.

Too often, lighting takes a back seat in the design and construction of landscape projects large and small. Major public projects, commercial landscapes, resorts, golf courses and residential gardens—both urban and rural—all need good lighting systems to bring out their ultimate beauty and use.

Lighting serves many purposes, the most obvious being safety and security.

It helps the traveler negotiate roads, find buildings, park the car, walk to a destination and approach the entry. Lighting can also show or mask specific vistas to the traveler, change a person's mood, extend the hours of enjoyment of a landscape, dramatize the changing seasons and provide safety.

The effect of lighting on landscapes and on people's emotions can be a powerful tool. To be most effective, it should be an integral part of a landscape—not a last minute addition.

Good lighting accomplishes its purpose and becomes part of the total landscape. Poor lighting gives illumination without consideration to psychology or aesthetics.

Good lighting design is a balancing act of various elements: functions, budget, aesthetics, maintenance requirements, and local regulations. The trick is to have good balance of all these elements through careful planning, good sense and the proper equipment.

Lighting effects

Outdoor lighting can have an enormous impact on the psychological and physical worlds. It can make people feel invigorated, relaxed, vulnerable, peaceful, secure or closed in. Bright glaring lights can be annoying, startling and even dangerous. Ironically, some low-key lighting systems can give a feeling of greater safety, security and warmth than brighter ones.

The physical world, too, can be affected by various lighting systems. Lighting certainly can attract insects, but that can be balanced by the increased use of a newly-lighted landscape area. Certain color lights make foliage look more beautiful (and sometimes even grow more quickly.) Light can emphasize textures of foliage, water and structures that do not contrast at all during the day. Pools or ponds that are inky pools in the dark become glowing pools of light or a re-

Susan Gibson is a freelance writer based in Cleveland.

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flective backdrop for a dramatic oak tree.

Lamp colors play a major role in setting the landscape mood. For instance, energy and cost-efficient, high pressure sodium bulbs often denote "crime area" in many people's minds. Mercury vapor lamps can make some skin tones seem eerie and unreal, but flatter the greens of foliage. Similarly, pinkish-tinged lights give skin a healthy glow, while making foliage look sick. Yellow "bug" bulbs make people and plants look unnatural. Bright, colored lights can give drama, but used too often, give a fairyland effect that may not be desirable.

Design element

Lighting can reinforce the architecture and become the definer of space.

"Lighting can be a separate design element," says Ken Bassett, Sasaki Associates. "The best lighting design tends to reinforce the overall structure of things. Even if it is well designed, lighting can detract if it is not integrated with the overall structure. Lighting gives balance, graphic design, furnishings to a landscape."

A project done by Edward Pinckney Associates in Charleston, SC, involved the master plan for the historic College of Charleston area downtown. According to Jim Tiller, the company chose several landscape elements that contributed to the historical theme and provided a continuity of design. Among them were special light fixtures that looked distinctly historical and blended with the period benches and other elements in the design.

The effect of lighting on landscapes and on people's emotions can be a powerful tool.

Lastly, lighting can be a magician with landscape space. It makes illusions for the eyes. It can extend or shorten distance. It can define or cloud dimensions. It can become the soft glow of moonlight, the drama of a theater spotlight, the magic of glitter. James van Sweden, a Washington, D.C. landscape architect explains,

"Lighting extends the whole landscape. It brings the outside in. You can light a landscape so that it looks endless. It does wonderful things for a garden."

Plant growth

One of the advantages of a nightscape is that it can accentuate the more beautiful growths in a landscape while accommodating seasonal and yearly changes. In a new landscape, for instance, fixtures can be placed to dramatize specific trees, shrubs or flower beds as they mature. A rotating system of lights can highlight spring blooms, summer perennials, bright autumn leaves or the silhouette of a special tree's branches in winter.

"In northern climates," explains Bob Brickman of Theodore Brickman Co., "there's a longer time without leaves. Lights can highlight the shadows of branching trees against the snow. It's a beautiful effect."

Light not only emphasizes plant growth, it also directly affects it. Plants and trees near light sources grow shoots and leaves more quickly; as a result they need more care.

An extensive lighting system can fool some annuals and perennials into blooming earlier or later than usual. Lights that extend the day in cooler months can confuse trees or shrubs that need dormant periods. They can keep growing late into the fall, or start blooming and flowering too early in spring. Either way, this can damage the plant and cause irregular behavior.

Light works for you

Each landscape has unique qualities that can be emphasized by light. The first step to designing the right lighting system is to determine the prime functions light will perform in your landscapes. Many projects use light for all four functions:

1 Safety and Orientation

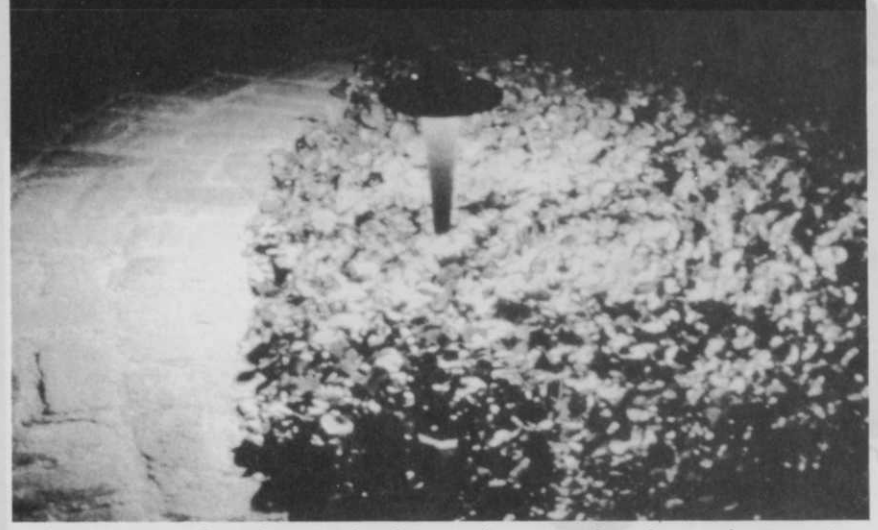
Lighting gives safe guidance through a landscape. It defines path and driveways, steps and inclines, obstacles, planes, walls and pools of water. Safe lighting welcomes people into the night, makes them feel secure in the dark and shows them how to avoid any potential hazards.

continued on page 48

Lamp Efficiency

Type	Wattages	Lumens Per Watt†	% Lumen Maintenance	Ave. Rated Life (Hours)
Incandescent	60-1500	15-24	90-95	750-2500
Fluorescent	40-215	63-100	66-88	12-20,000+
Mercury Vapor	50-1000	30-60	75-89	16-24,000+
High-Pressure Sodium	50-1000	79-130	90-91	10-24,000+
Low-Pressure Sodium	18-180*	62-150	100	10-18,000
Metal Halide	175-1500	69-115	77-80	10-20,000

† Initial lumens per watt including ballast losses.
* Does not account for wattage increase over lamp life.



Lights can not only *enhance a landscape, they provide safety and orientation features as well.*

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Well lighting is less *conspicuous while at the same time providing utility and compactness.*

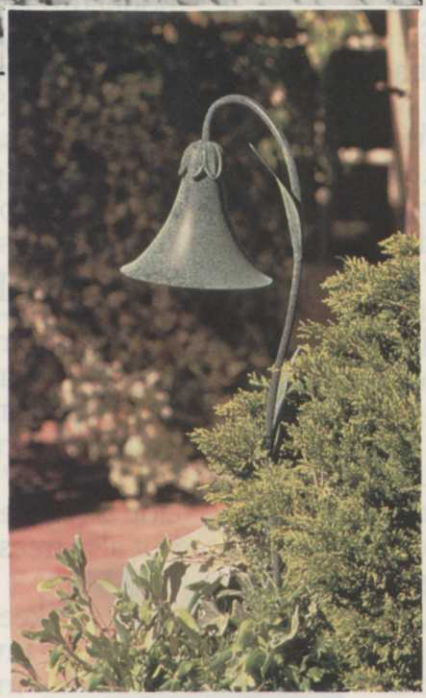
2 Security
Protective lighting makes people feel safe—not threatened. Security lighting systems illuminate walkways, open areas such as parking lots, buildings, entries, and other areas. Glaring, harsh lights often do more to make people feel insecure than secure. Protective lighting should give evenly distributed light and leave no shadows. "People actually get a greater sense of security where softer lighting illuminates plants and the edges of space," advises Bassett.

3 Environment Integration
This effect is achieved through effective area lighting. It can also enhance security and safety/orientation and gives a unity to a landscape area by defining space and giving a background to it. It is best achieved through a combination of techniques that help it set the tone of a landscape and still allow room to highlight dramatic elements.

4 Dramatics
The ordinary by day can be the star at night through the use of lighting for dramatic effect. Subtle lighting techniques catch the eye and focus it on a beautiful feature such as a reflective pool, branching structures, contrasting textures. Use dramatic techniques to highlight sparkling water, striking sculpture, special plants.

A balancing act

Before you get specific on lighting system design, consider first the special requirements that each landscape has. Cost, obviously, has primary influence on the choice of a system. Good lighting is not cheap, but the costs can be absorbed by the amount of use it opens up in an otherwise unused nightscape. If the landscape will get plenty of use, don't skimp on lighting design and materials. The budget may determine how much of a landscape is illuminated, what kind of bulbs and fixtures can be used, and how the overall design will work.



During the day, this *flower-form fixture blends subtly with adjacent landscaping. It is particularly suited for lighting steps, entrances, pathways or special interest areas.*

According to Ken Bassett, the main considerations in lighting system design are "cost of equipment, energy consumption, maintenance, possible vandalism costs, local regulations, the relationship of hardware to the overall design and its aesthetic appeal."

The design is made up of those elements that the designer "feels more strongly about, within the parameters of budget and maintenance costs," he adds.

And remember, too, the cost avoidance aspects of good lighting. It can help prevent vandalism, break-ins, and other crimes; vehicle-vehicle and vehicle-pedestrian accidents, as well as the slipping-tripping accidents which can sometimes result in a lawsuit.

Water, foliage and surfaces have different reflective levels—shiny leaves reflect more; sparse foliage reflects less.

Creativity can help you get the effects you want within these parameters. Judicial use of energy-efficient lighting, cost-saving fixtures, use of natural elements, and experimentation can make the difference in achieving the perfect nightscape. "We try to use existing structures or trees for our fixtures; this saves the cost of installing large poles or posts," says Lee Behnke, Wm. Behnke & Associates.

Jim Tiller explains, "We design a lot of our own light fixtures to achieve the effects we want—for aesthetic and functional reasons."

Costs

Maintenance costs can be a key element in lighting decisions. Exotic effects such as moonlighting, twinkle lights and multiple path lights all add beauty, but are often time-consuming and costly to maintain. Subtle lights are often inefficient, requiring frequent bulb changes. Some fixtures need more cleaning than others to assure proper light and bulb efficiency. Certain bulbs loose efficiency after a period of time and must be replaced long before they burn out for maximum energy savings.

Vandals are often attracted to the more creative uses of light. Bulbs, fixtures and even electrical controls are

continued on page 50

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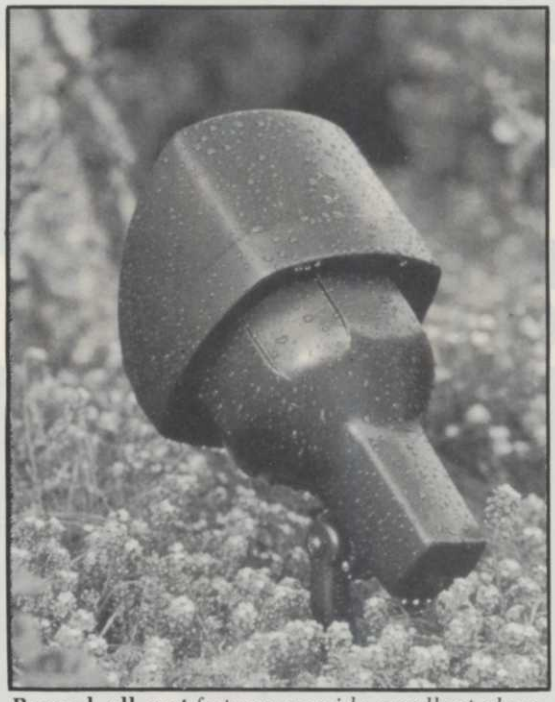
LIGHTING *from page 48*

vulnerable to vandalism. Consider this in the context of your landscape's location, security and maintenance budget.

Local regulations can have a powerful voice in the choice of lighting systems. Many areas have strict policies about types of bulbs and fixtures, installation and wiring procedures, placement of materials, light invasion to neighboring properties and safe brightness levels. These rules apply specifically to streets and drives, signs, parking lots, pedestrian areas, pools and other areas. Planned communities and resorts, reports Jim Tiller, "often have more types of controls and restraints on lighting systems."



Rugged, all-cast *fixtures provide excellent glare control and withstand considerable abuse.*

Lighting up

Study nightscapes in your area to become familiar with the many types of lamps and their effects on the landscapes and the people in them. Every type of lamp has certain advantages and drawbacks. Some of the main lamp types and their characteristics include:

1 Incandescent—These and quartz incandescent lamps are frequently used in spot and floodlights. They give a warm, "white" light that can look very natural on people and plants. They are not very long-lived or energy-efficient.

2 Fluorescent—These tubes can also give a whitish type of light. They have limited outdoor uses, but perform well for lighting signs and walls. They are much more long-lived and energy-efficient than incandescent lamps.

3 Mercury Vapor—Use clear "blue" mercury vapor lamps to bring out the green foliage of landscapes. These lamps are not highly energy efficient, but they do give long life. Sometimes they also give the wrong aesthetic effect.

4 High Sodium—Widely used for large area lighting, these golden white tone lamps give great efficiency, brightness and long life, but may not be suitable in the "natural" looking landscape.

5 Low Pressure Sodium—These are the most efficient of all lamps, but all colors they illuminate appear as shades of gray. They are useful only for security purposes or for safety/orientation.

6 Metal Halide—Also very efficient and long-lived, these lamps can cast a greenish hue and bright light over large areas which may be too much for the "quiet" landscape. "Color-improved" versions are now available.

Recommended Brightness Levels

Lighted Area	Footcandles
Building Exteriors	
Entrances:	
Active (pedestrian and/or conveyance)	5
Inactive (normally locked, less used)	1
Vital locations or structures	5
Building surrounds	1
Buildings & Monuments, floodlighted	
Bright surroundings	
Light surfaces	15
Medium light surfaces	29
Medium dark surfaces	30
Dark surfaces	50
Dark surroundings	
Light surfaces	5
Medium light surfaces	10
Medium dark surfaces	15
Dark surfaces	20
Gardens	
General lighting	0.5
Path, steps, away from structure	1
Backgrounds—fences, walls, trees, shrubbery	2
Flower beds, rock gardens	5
Trees, shrubbery, when highlighted	5
Focal points, large	10
Focal points, small	20
Parking Areas	
Self-park areas	1
Attendant-parking area	2

Nightscapes

Great nightscapes depend on a healthy balance of aesthetics, function and budget. According to Jim Tiller, "Great lighting is an exacting kind of science. The effort for good lighting is a time-consuming process, especially where pedestrian areas are involved."

Water, foliage and surfaces have different reflective levels—shiny leaves reflect more; sparse foliage reflects less. Light locations and brightness levels must incorporate these elements in the design.

Depending on the landscape, different amounts of brightness will be required.

Brightness is measured in footcandles (FC), and varies from dim (natural moonlight equals .1 FC) to bright (office lighting equals 70-150 FC). Generally, dim lighting measures up to .5 FC. Medium-bright includes lighting between .5 FC and 8 FC. Bright includes everything over 8 FC. For aesthetic and practical purposes, landscape lighting need not be excessively bright to do the job.

Most designers use a system of plans and charts that let them place prospective lights determined on the amount of footcandles. By plotting isobars, you get a picture of light sweep and overlap in areas—this helps maintain even levels of brightness and avoid large areas of shadow.

Manufacturers often provide materials that help you figure the amount of light and proper placement for landscape areas. Don't forget to include the effects of light trespass from inside buildings from neighboring properties, and from nearby streets and drives. This may increase brightness levels in the landscape.

Avoid glare at all costs. Glare not only ruins subtle effects; it also is dangerous when it shines in people's eyes. To avoid glare, hide the light sources out of direct view and use fixtures that are shrouded or hooded to direct light on specific areas. For safety's sake, keep fixtures out of visitor's paths. Proper placement also gives a more natural look.

A unified lighting design depends on using one major type of lamp, two at the most. You can achieve a wide variety of effects with one or two lamp types; more than that can present a riotous and conflicting lightscape of too many colors and effects.

continued on page 54

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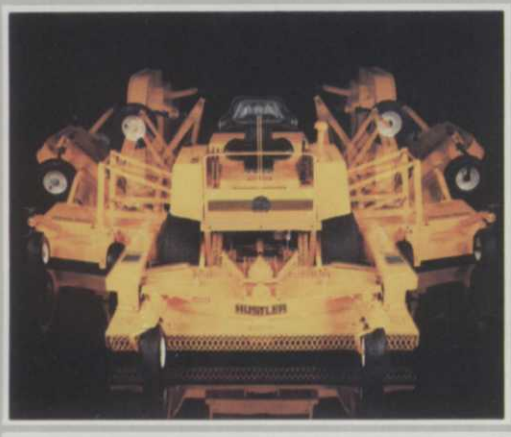

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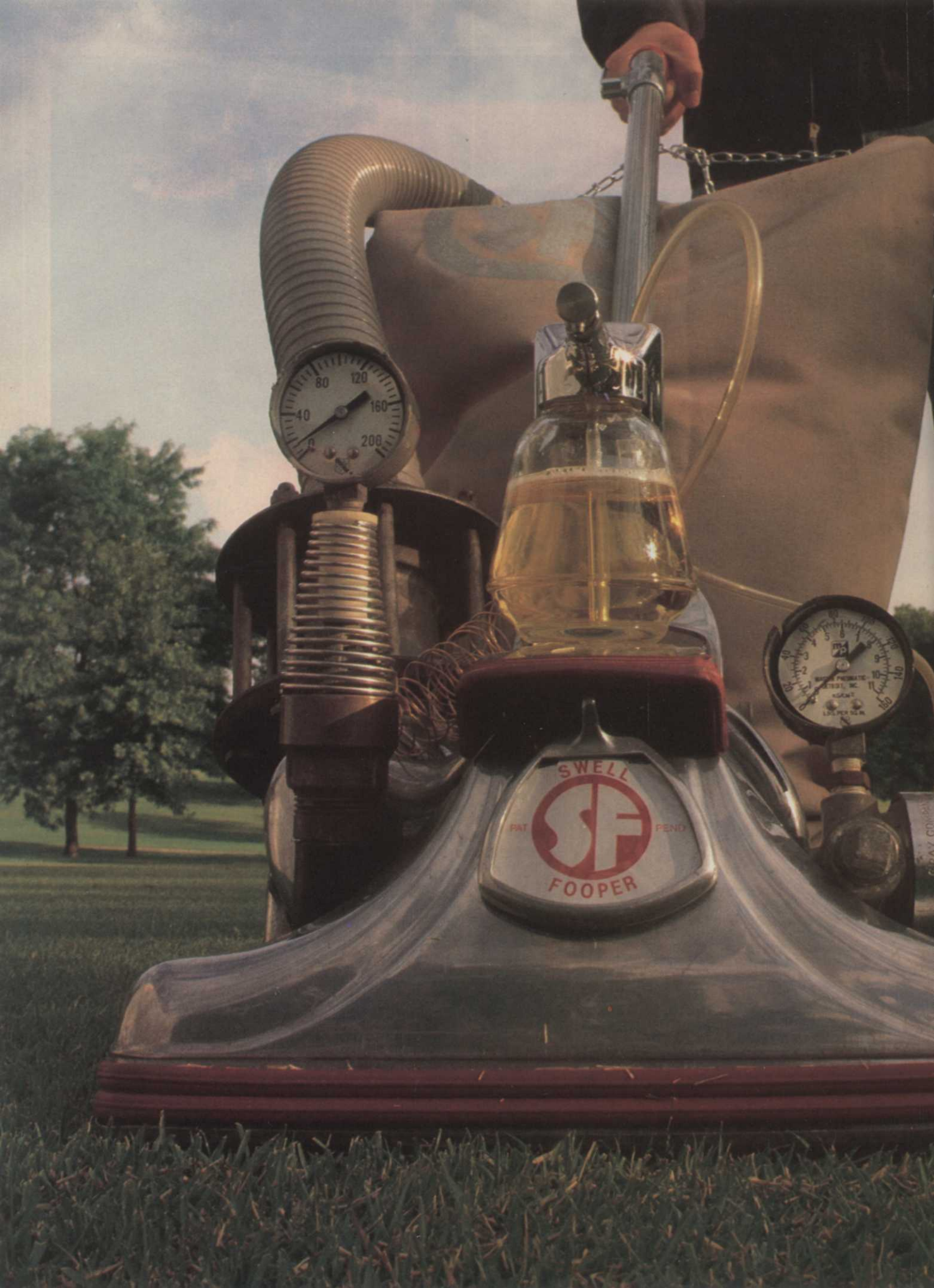
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LIGHTING *from page 50*

Electric lighting systems offer many options. Dimmers give the client more or less light when needed. Time clocks and photocells make the lighting system automatic. Built-in security systems add alarms and direct police communication for emergencies. System controllers let you customize the display to exact specifications.

Putting it together

Whether a lighting system is part of an original landscape plan or added at a later time, the design process requires some careful thought about priorities. Some points to consider:

- What are the strong points of the landscape that will be emphasized?
- What are the main walkways, views, specimens that must be illuminated?
- What hazardous areas are there? How will visitors orient themselves?
- What space will you create—the floor, walls, and ceiling with lights?
- What specific uses call for special treatment?
- What areas should be hidden or contrasted with brighter spaces?
- What mood do you want to set?
- What architectural, regulatory and aesthetic rules apply?

Maintenance

Lighting systems should be designed with maintenance in mind. More expensive fixtures and lamps often pay for themselves with reduced maintenance costs. For instance, mercury vapor, high-pressure sodium, and metal halide lamps last much longer than incandescent lamps. This factor can make them more suitable for uses in hard-to-reach areas such as tall poles, building roofs or trees. Similarly, heavy-duty fixtures and electrical equipment give longer life than cheaper, more delicate units.

Well lights, spotlights and other fixtures used for uplighting need frequent cleaning to keep dirt and leaves from blocking off light. Sprinkler systems often leave hard water deposits on fixtures that can eventually damage housings. Underwater lights must be cleaned to prevent mineral deposit buildup on lens and housings. Normal atmospheric corrosion can damage housings in urban and ocean environments.

Hard-to-reach and multiple fixtures require much time and effort to keep the system running right and these costs should be included in the maintenance budget.

Landscape maintenance needs also change with lighting systems.

More frequent and careful pruning may be needed on ground covers, low plants and shrubs near direct light sources. You may have to relocate some light sources to avoid glare, if major pruning changes the lighted background. As trees and large shrubs grow, the cables attached to them may need realignment. Plant growth rates may change with large lighting systems. Be prepared to make adjustments.

One Washington, D.C. landscape architect installs a "temporary" system of lighting that lets clients adjust elements to their needs. James van Sweden explains, "We place double outlets in the landscape about 12 feet apart. The client can add fixtures and move them around to try different effects. This gives them as much lighting as they want." **WT&T**

Editor's Note: The National Lighting Bureau publishes a variety of self-help guides. All are written in lay terms and are heavily illustrated. A directory of Bureau publications is available free of charge by contacting the NLB, 2101 L Street NW, Suite 300, Washington, D.C. 20037.

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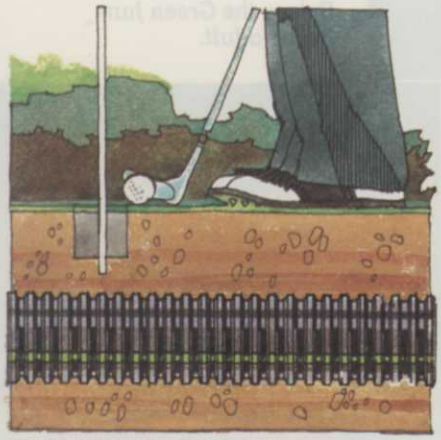

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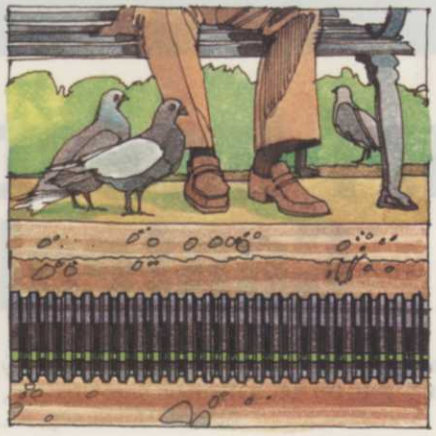

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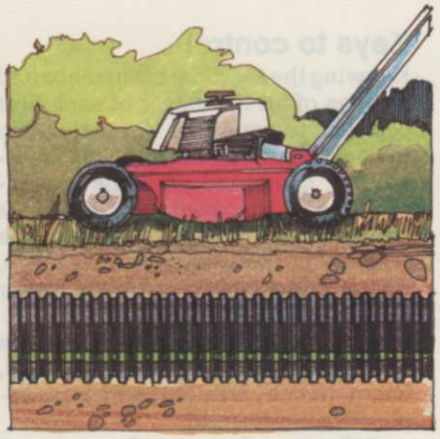

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Left, billbugs of concern *include the bluegrass billbug (small) and the Hunting billbug (larger). Below, the Green June Beetle adult.*

Turf Insect Control

by **Harry D. Niemczyk**, Ph. D., professor of entomology, Ohio State University, Wooster, OH and **Patricia Cobb**, Ph. D., extension entomologist, Auburn University, AL.

Entomologists and turf specialists, by placing attention on turf varieties as well as turf pests, are discovering new control methods.

Dr. Reed Funk of Rutgers University discovered a species of fungus (called an endophyte), growing within certain ryegrasses and tall fescues. The endophyte imparts resistance to feeding by certain insects.

Further research has also identified turfgrass varieties that are highly susceptible to insect injury. Avoiding use of susceptible turf varieties and encouraging use of varieties with some resistance will reduce the need for insecticides applied to turf.

Meanwhile, insecticides remain the primary means of control as research proceeds on alternatives and supplemental methods of controlling insect damage to turf.

Keys to control

Knowing the seasonal occurrence and damage of all life stages of each pest common to your area is a major step toward effective control. This information, combined with the characteristics of the particular turfgrass cultivar and the known length of the residual of the proposed insecticide, makes insect control scientific rather than speculative.

Still, there will be twists to confuse any control program, such as soil type, heavy thatch, weather, and poor application uniformity.

Differences between the cool- and warm-season zones and among mountains, plains, and coastal areas, also result in variations in pest species and their seasonal occurrence. Knowledge of each pest's life cycle in your area is often as important as the choice of insecticide.

The purpose of this guide is to point out some major pests to watch out for in cool- and warm-season turfs in 1985, when their vulnerable stages occur, and some insecticides that may be used. No endorsement of named products is intended nor is criticism implied for those not mentioned.

LATE WINTER (March)

Chinchbugs and Billbugs—In northern zones chinchbugs and billbugs both overwinter as adults in thatch or sheltered sites near buildings. They can become active during warm days in March. Infestations of the hairy chinchbug and bluegrass billbug occur in zoysia, Kentucky bluegrass and fine fescues.

In southern Florida, the southern chinchbug is active throughout the

year. Most varieties of St. Augustinegrass and some bermudagrasses are damaged by southern chinchbugs. Zoysia and bermudagrass are more likely to be infested by the hunting billbug.

When summer damage from chinchbugs and/or billbugs is expected in cool-season areas, a preventative application of liquid or granular Dursban® (chlorpyrifos-1 lb. AI/acre), diazinon (2.5 to 4 lb. AI/acre), or Oftanol® (isofenphos-2 lb. AI/acre) may be made as soon as these insects begin to move about. Treatment at this time controls adults before eggs are laid. If spring is early, these applications may be needed as early as the second week of March. During a late spring, applications may need to be delayed until the last week of March.

Retreatment for chinchbugs in mid to late summer may be necessary if reinfestation from adjacent untreated areas occurs.

Preventative treatments may not be successful in southern Florida where the southern chinchbug has multiple generations and is resistant to most organophosphate insecticides in some areas. In southern Florida, where resistance is a problem, the insecticides Pydrin®, Pounce®, or Baygon® have been substituted for organophosphates. Replacing susceptible turf varieties with Floratam St. Augustinegrass, a variety highly resistant to the southern chinchbug, will provide excellent natural control.

Grubs—The larvae of this group of pests normally overwinter six inches or deeper in the soil. If spring comes early, grub activity can be expected along with skunks and racoons who will tear up the turf searching for the grubs. Moles, who feed on grubs and earthworms, also become active at this time.

Application of Oftanol® (2 lb. AI/acre) during March when frost is gone from the ground, provides control of overwintered grubs as they return to the surface. In cool-season areas, such treatment is sufficiently residual to provide adequate control of fall grub infestation. In addition, treatment at this time also kills overwintering chinchbugs and billbugs and reduces infestations of these insects during the summer.

Mole crickets—Mole crickets have extended their range from Florida and eastern Georgia into southern Louisiana and eastern Texas. Timing of treatments is critical and varies from one area to another.

The tawny and southern mole crickets are the primary pest species. Except for southern Florida, both have one generation per year. Mole crickets become active in March from north central Florida throughout their range in the Gulf States after overwintering deep in the ground as adults or nymphs. Tunnelling and some feeding damage takes place at night in moist soil and increases as mole crickets become more active. Both mole cricket species begin spring mating flights in late March. In most areas March treatment is seldom required.

Entomologists *Dr. Harry Niemczyk and Dr. Pat Cobb.*

In years when feeding of overwintered mole crickets resumes ealier than normal, Oftanol® (2 lb/ AI/acre) has been used with some success. Generally, such applications are better made later in the year.

Black Turfgrass Ataenius—This golf course pest overwinters as an adult in the soil under debris in roughs or other protected areas. A few may be seen flying about on warm afternoons in early March. Usually this activity begins when crocus starts blooming and intensifies as the bloom of red bud appears.

While an applications of Oftanol® in March may be successful in preventing summer infestations of larvae, the probability of success is increased by waiting until April.

Greenbug—The only stage of the greenbug known to overwinter in northern states is the egg. Shiny black eggs deposited the previous fall may be found adhering to grass blades, fallen tree leaves, or other debris.

Treatment for the greenbug is not appropriate during the late winter.

Sod Webworms—The most common sod webworm species overwinter as larvae in the thatch or upper inch of soil. Feeding does not resume until hibernation (dipause) is broken by early spring warmth.

Treatment for sod webworm is usually not appropriate during late winter.

SPRING (April-May)

Chinchbugs and Billbugs—As warm days of spring approach, movement of chinchbug and billbug adults increases rapidly. Generally, egg laying begins the first week of April on warm-season turf and the first week of May on cool-season turf. Occasionally adult billbugs can be seen wandering about on sidewalks on warm afternoons.

Generally, application of insecticides to prevent infestations of chinchbugs and billbugs should be completed by the first week in May in cool-season and mid-April in the South. Such applications are made before significant numbers of eggs are laid. This time may vary as much as a week or more depending upon the spring weather.

When the preventative approach is not used and southern chinchbugs are detected in May, diazinon (4 lb. AI/acre) provides control. In areas with three to five generations, two retreatments at six week intervals may be needed.

Grubs—Overwintered grubs return to the surface and begin feeding on turfgrass roots in April. Increased activity and damage from moles, skunks, and racoons foraging on grubs can also be expected. Feeding by mammals and grubs continues through May.

In cool-season areas, a single application of Oftanol® (2 lb. AI/acre) made during April has been successful in controlling overwintered grubs with one year life cycles and preventing subsequent infestations during late summer. Application made during May may not provide immediate control, however, prevention of the late summer infestations may be expected.

Infestations of such grubs can also be controlled during April (South) or May (North) by spot or general treatment with Turcam® (bendiocarb, 2 lb.

continued on page 60

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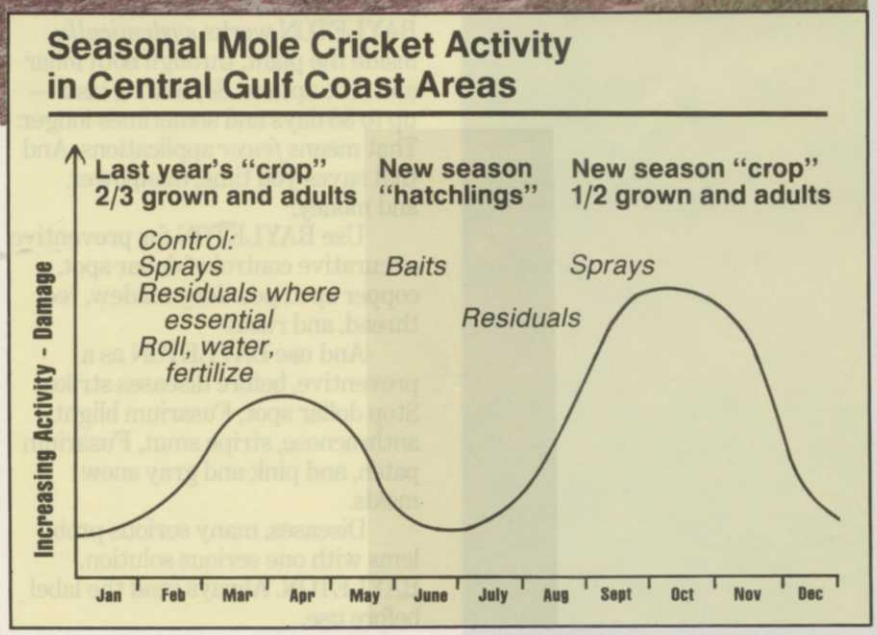
Shown left, *mole cricket damage to home lawn.*



AI/acre), Proxol (trichlorfon, 8 lb. AI/acre) or diazinon (5-6 lb. AI/acre). Golf course superintendents may also use ethoprop (Mocap®, Scotts Nematicide/Insecticide, 10 lb. AI/acre). Sevin® (carbaryl, 2-4 lb. AI/acre) has been effective against larvae of the green June beetle.

Treatment should be delayed until grubs are in the top one inch of soil. Irrigation or rainfall should follow such applications to move the insecticides to the target grub as soon as possible.

Although milky spore disease products for control of Japanese beetle grubs may be applied anytime there is no frost in the soil, spring is a good time for such applications. The soil is open and frequent rains move the disease spores into the soil. It should be noted that only the Japanese beetle grub will be affected by milky spore.

Infestations of large grubs (larvae of June bugs) have been occurring on a three-year cycle in some areas of Michigan and Minnesota. Locations of such infestations should be identified because reinfestation is likely every three years.

Controls such as Oftanol®, diazinon, Proxol®, or Turcam® should be applied in August or September during years of when large numbers of adults are seen.

Eggs are laid in May and June, therefore treatment should be made in late summer, early fall of that year or early the next spring while the larvae are small. Later applications against full-grown larvae have given inadequate control.

Mole crickets—Damage increases in April from north central Florida throughout the southern areas of the Gulf States. Mating and dispersal flights continue as egg laying and hatching begin.

Spring treatment is often necessary in areas that were severely damaged last fall. Small damaged areas can be rolled or otherwise packed down so the turf roots are reconnected with the soil. To determine cricket presence, pour soapy water (2 oz. liquid dishwashing detergent in one gallon of water) on turf areas where infestation is suspected. Crickets will usually surface in 3 to 15 minutes (longer in cool weather).

Turcam® (2 lb. AI/acre), diazinon (spray or granules, 5-6 lb. AI/acre), Mocap® 10G (ethoprop, 10 lb. AI/acre, commercial turf only), or Oftanol® (granular or liquid, 2 lb. AI/acre) can be used to control spring infestations.

In less critical areas, short residual treatment with Turcam® (2 lb. AI/acre) or diazinon (5-6 lb. AI/acre) applied in late April or May may be adequate.

Critical turf areas may require greater residual control provided by early April insecticide applications. Mocap® 10G (10 lb. AI/acre) provides up to four weeks control and Oftanol® (2 lb. AI/acre) up to eight weeks control. Treatments should be made late in the day if possible and watered in immediately.

Black turfgrass ataenius—Adults of the black turfgrass ataenius can be seen flying about in April and are often found in clipping catchers after early mowing of golf course greens. These adults begin laying eggs in early May, or about the time Vanhoutte spirea first comes into bloom. Check with local extension for a more precise time if needed.

Applications of Oftanol® during April or May has successfully prevented larval infestations during the summer. Diazinon (5-6 lb. AI/acre) applied to fairways during egg laying kills adults and also prevents the development of summer larval infestations.

Sod webworms—Overwintered larvae of the sod webworm begin feeding as soon as the grass begins to grow. Usually damage is insignificant, but areas that do not green up may be infested. These areas frequently have probe holes from starlings feeding on the larvae.

In warm-season areas webworm larvae pupate during late March and

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early April. Moth flights begin in April in southernmost areas and during May in more northern areas.

Young larvae are usually present about two weeks after the spring moth flight peaks, so treatment of young larvae can be done in May in some areas.

When necessary, a wide range of insecticides including diazinon, Proxol®, Aspon®, Sevin®, and others applied at labelled rates may be used to achieve control.

Cutworms—Moths of cutworms begin laying eggs on golf course greens and other turf areas in the spring. These eggs hatch producing larvae that feed on grass blades during the night. The black cutworm is the most common species on cool-season turf.

While visible damage is uncommon on home lawns, damage can be significant on golf course greens in late May.

Black, granulate, and variegated cutworm moths become active in March and April in the South. Larvae are present on turf, especially on golf greens and tees. Damage can become evident as early as mid-April. By May, the larvae are large enough to cause severe damage.

Generally the insecticides effective against sod webworm are also effective against cutworms. The principle of controlling these pests is to apply the insecticide late in the afternoon and allow night-feeding cutworms to contact the treated foliage. Irrigation following liquid application is therefore not advisable.

Greenbug—Greenbug eggs begin hatching as early as April, but significant infestations do not develop until later in the year. Aphid numbers are too low to detect.

Winter grain mite—Damage from this mite is often first noted in April when home lawns are receiving spring fertilizer applications. By late May, the mites will have laid their eggs and died. Mites do not appear again until the eggs hatch in October.

If treatment is necessary, liquid diazinon or Dursban® will provide control.

Clover mite—Incidents of visible damage to home lawns has been seen in April in several Ohio cities and Denver, CO. Usually a nuisance pest in and around homes, the clover mite appeared in large numbers (5,000 per sq. ft.) across entire lawns and on turf next to building foundations. Symptoms of injury were the same as the winter grain mite. Turf next to foundations was often killed.

The clover mite has a slightly pink body and eight pale-colored legs. The first pair of legs are extremely long and protrude well out in front of the mite. The absence of bright red legs distinguishes the clover mite from the winter grain mite.

Treatment with liquid diazinon (2.5 lb. AI/acre) or Dursban® (1 lb. AI/acre) readily provides control.

Fire ants—Fire ants are spreading across much of the South causing serious and painful injury to man and animals. They begin establishing new mounds during warm, wet days of spring. During this time, ants are active near the surface of mounds and workers are foraging for food.

Mound treatments include diazinon granules or drenches, various Dursban® formulations, Oftanol®, or MC-96® (trichloroethane). Read the label for specific directions for mound treatment. Do not disturb the mound before or during treatment.

Where mound treatment is impractical, the turf can be treated with Amdro® fire ant bait (no more than 1.5 lb. AI/acre). All the bait should be used within three days of opening. Retreatment during the fall is usually necessary.

SUMMER (June-August)

Chinchbugs—In northern cool-season turf chinchbug eggs continue to hatch into June. Bright red nymphs appear. The number of chinchbugs increases rapidly in June and peaks in July when northern lawns can receive severe damage. This damage is often masked by summer dormancy of turf caused by drought.

During August the nymphs molt into adults that mate, lay eggs, and produce a second generation. Some northern areas have only one generation per year.

Southern chinchbugs are not usually a problem in well-irrigated turf or during summers when rainfall is plentiful. Southern chinchbug-damage first appears during the dry periods of June and July. Damage may continue throughout the summer and into the fall because of overlapping generations.

A wide range of insecticides may be used at label rates to control existing infestations. They include Dursban®, diazinon, Aspon®, and Sevin®. Treatments should be made before injury is severe, otherwise, damaged areas may not recover.

Areas of southern Florida have pockets of southern chinchbugs resistant to these insecticides. Pydrin®, Pounce®, or Baygon® may be substituted. Floratam St. Augustine, a chinchbug resistant variety, should

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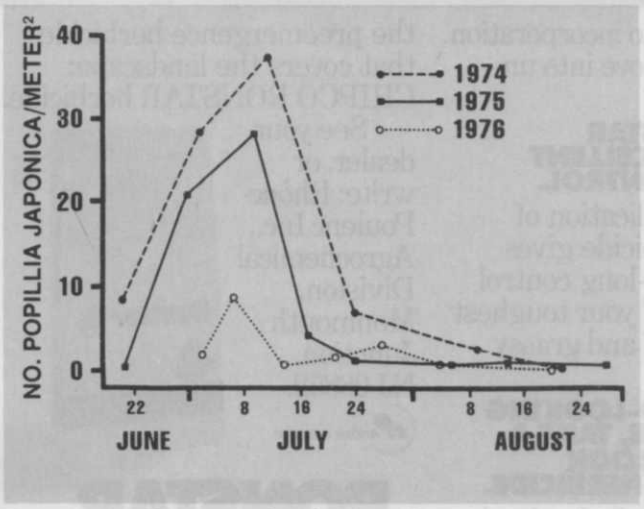
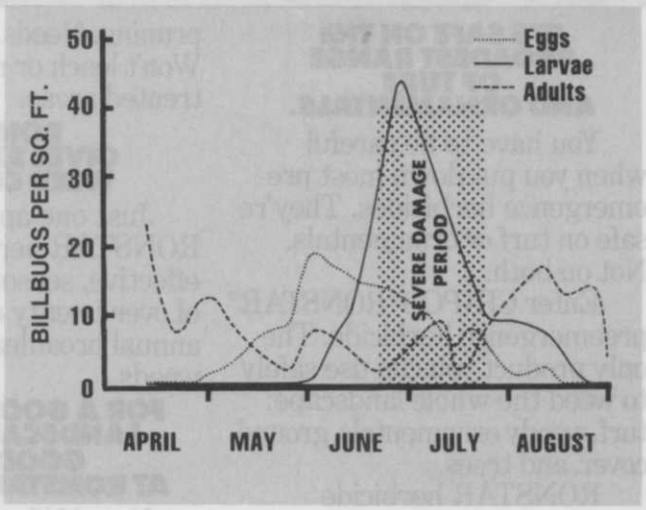


Emergence of Japanese beetle, *Popillia Japonica, adults from fescue sod in northern Georgia.*



Life cycle *of the bluegrass billbug in Ohio.*

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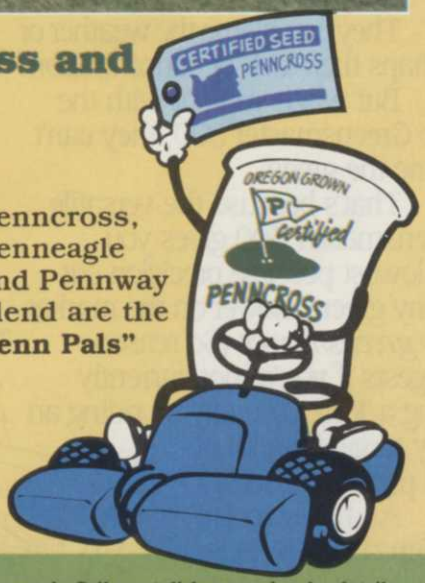

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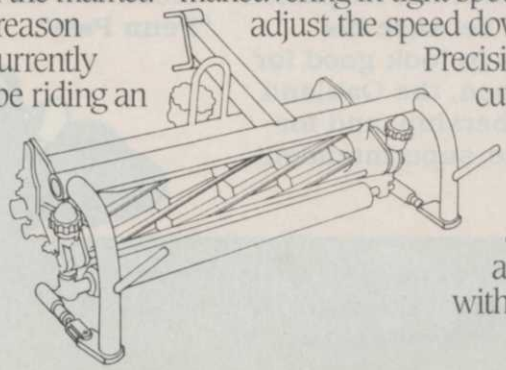

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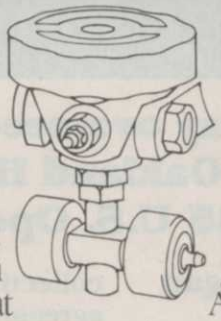

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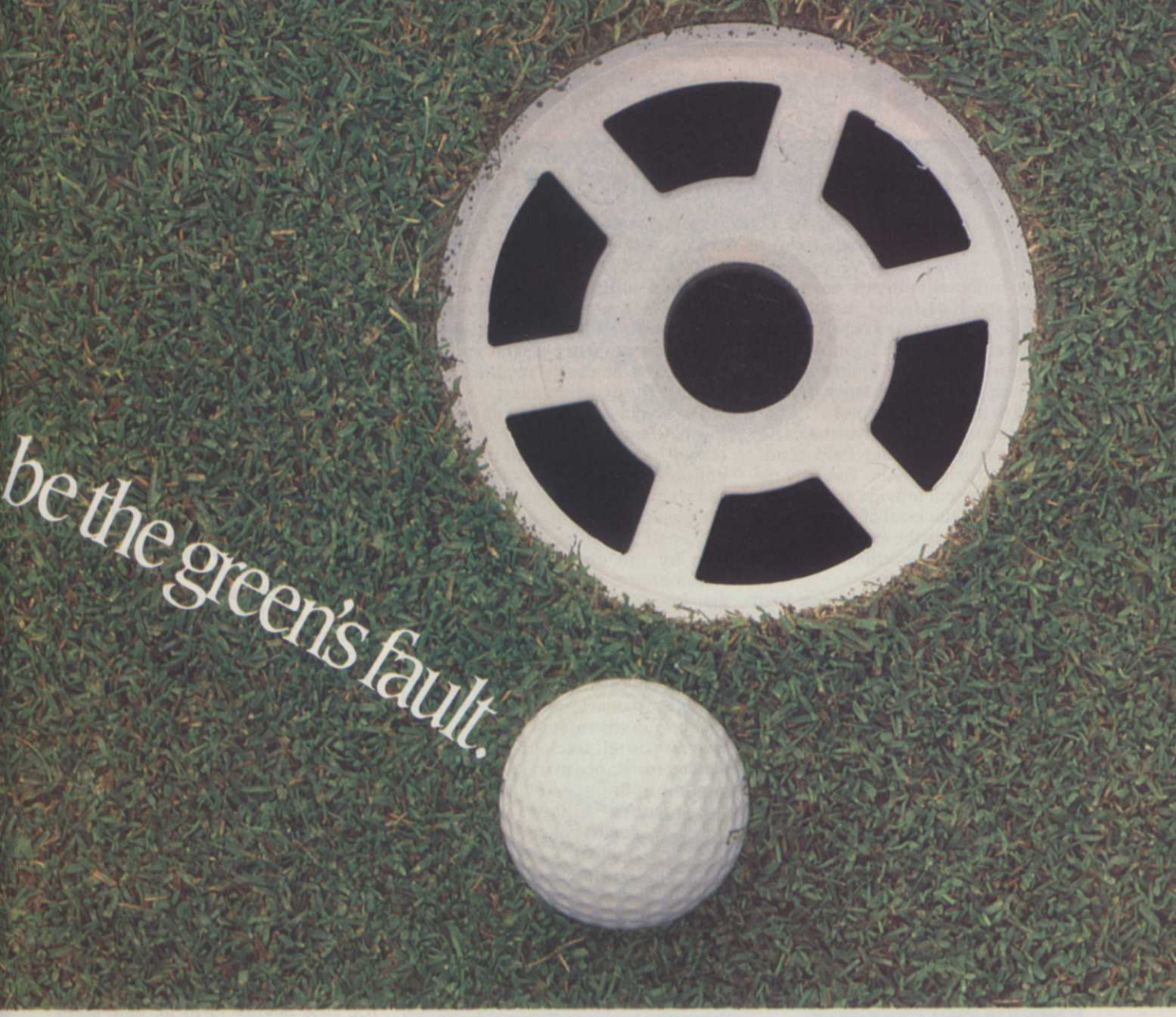

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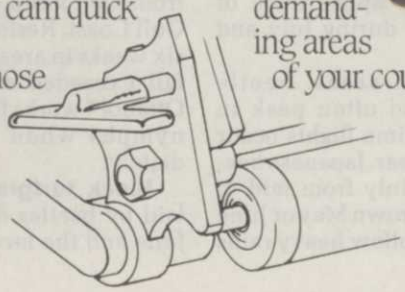

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Insect and Mite Resistance in Turf

by Roger H. Ratcliffe, Agricultural Research Service, Field Crops Lab, Beltsville, MD

Few turfgrass cultivars have been bred specifically for insect resistance. Experimental lines or cultivars, developed for other traits, have been reported to demonstrate varying levels of resistance or tolerance to insect or mite pests.

In many instances, resistance has been observed under field conditions in limited trials. The data obtained may not provide an adequate measure of the level of resistance or tolerance, since the expression of resistance will vary with the severity of natural infestations.

The response of cultivars bred specifically for insect resistance has been studied more thoroughly, and field performance can be predicted more accurately.

Recently, increased emphasis has been placed on developing turfgrass cultivars with insect resistance, in much the same way as selection for disease resistance has been conducted. This research has involved both laboratory and field evaluation of plants for sources of resistance to pests such as the fall armyworm, the southern chinchbug, hairy chinchbug, bluegrass billbug, greenbug, mole cricket, sod webworm, and several mite species. A summary of the results from this research in provided in Table 1, on page 68.

Two approaches are being taken to develop insect resistant turfgrass cultivars. The first is selection for genetic sources of resistance within adapted cultivars or experimental materials (i.e. southern chinch bug resistance in 'Floratam' St. Augustinegrass).

A second approach is developing cultivars with induced resistance by infecting them with endophytic fungi. Resistance to sod webworm in 'Repell' perennial ryegrass is an example.

Repell has a high level of infection by the endophytic fungus *Acremonium coenophialum* Morgan-Jones and Gam. The fungus lives within the host plant, but does not injure it. Substances produced either by the fungus, or the plant in response to invasion by the fungus, cause resistance to some insects.

Endophyte-infected perennial ryegrass or tall fescue has demonstrated resistance to sod webworm, several aphid species (including the greenbug), billbug, and a *Hyperoides* species called the Argentine stem weevil. There are also indications from field studies of chinchbug resistance.

With the development of new or improved methods of selecting for insect resistance, greater emphasis will be directed to breeding insect resistant cultivars in the future. Presently, however, insecticides remain the major method for controlling major insect pest species. □

be the primary turf variety grown in more southern coastal areas and Florida where southern chinchbug is a problem.

Billbugs—The bluegrass billbug larvae feed in grass stems during June but move to the plant crowns and roots during July. This feeding causes brown spots that frequently resemble the symptoms of some fungus diseases. Symptoms are also often masked when the turf is dormant from drought. During August the larvae burrow deeper into the soil to pupate and transform into adults.

Infestations discovered during this time may be treated at the same rates used for existing grub infestations with diazinon, Turcam®, and Proxol®. Irrigation or rain following application is needed for optimal results. If larvae are feeding in the root zone, control may be difficult to achieve. Oftanol® applied during June should control feeding larvae and provide control of late summer grub infestations.

Grubs—By June, in cool-season areas, grubs have stopped feeding and are in the pupal stage three to four inches in the soil. Beginning in mid-June and continuing through mid-July, the adults of various species emerge and burrow into the soil to lay eggs. Hatching and appearance of young larvae occur during July and August.

In warm-season areas, beetle flights continue and often peak in June, although the time flights occur varies from year to year. Japanese beetle flights occur mainly from mid to late May and June. Brown May or June beetle flights often follow heavy rains in late May and June. New generation grubs of most southern species can be found by mid-August.

Oftanol® applied in June provides control of developing grubs during August as well as chinchbug and billbug larvae present in the turf at the time of application. Existing infestations of grubs found in August may be treated with Proxol®, Turcam®, Oftanol®, diazinon, or Mocap® (commercial turf only) at standard label rates. Sevin® (2-4 lb. AI/acre is effective against the green June beetle larvae.

Extreme heat and drought during the summer may cause grubs to move deeper in the soil. Under such conditions, irrigation several hours before treatment and a thorough soaking afterward is advisable.

Mole crickets—Egg laying diminishes in late June, and newly hatched nymphs of both species feed voraciously. Tunneling damage suddenly becomes obvious in July as the nymphs grow larger. Because of the potential for sudden damage at this time, turf areas should be inspected several times a week during this period.

Poison baits have been effective in controlling mole cricket nymphs from June through August in the area from central Florida north and west through the Gulf States. Baits work best in eastern Georgia during spring and fall. Bait applications often must be repeated one or more times.

Bait formulations available include: 2% Baygon® (.5 lb./1,000 sq. ft.), 20% Sevin® (5-10 lb. bait/acre), 5% Dursban® (150 lb./acre or two applications of 75 lb./acre three weeks apart), and 2% malathion (100 lb./acre or two applications of 50 lb./acre three weeks apart).

Mole crickets are more active at night in moist soil. Turf should be irrigated several hours before baits are applied. Delay application until later in the day and do not irrigate for 2-3 days thereafter.

Residual control of mole crickets with Oftanol® (2 lb. AI/acre) may vary with location and amount of rainfall. Applications of Oftanol® have given up to 12 weeks control from the Florida panhandle along the Gulf Coast. Residual control was only six weeks in areas where August rainfall exceeded eight inches weekly. Oftanol® works faster on mole cricket nymphs when watered in immediately.

Black turfgrass ataenius—Eggs laid by beetles during May hatch in June and the larvae begin feeding on

New CHIPCO® MOCAP® insecticide gives you the kind of grub control you need...control that's fast and effective.

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TABLE 1

Summary of Insect and Mite Resistance in Turfgrasses

Insect/Mite	Grass
Bluegrass Billbug	*Kentucky Bluegrass*- No resistant cultivars released. Lower larval counts and/or less injury reported on 'Aquila', 'Arista', 'Arboretum', 'Delta, 'Geary', 'NuDwarf', 'Nebraska Common', 'S-21', 'South Dakota Common', and 'Windsor'. *Perennial ryegrass*- Endophyte-induced resistance in 'Pennant' and 'Repell'.'Repell' is the only cultivar developed specifically with endophyte-induced resistance to billbugs.
Fall Armyworm	*Bermudagrass*- Cultivars 'Tifton 44' and 'Tifton 292' show moderate and high resistance, respectively. Research is underway to incorporate resistance into good turf types.
Hairy Chinch Bug	*Kentucky Bluegrass*- No resistant cultivars released. In laboratory tests 'Baron' and 'Newport' demonstrated higher levels of tolerance to adult feeding. *Fine-leaf fescues*- No resistant cultivars released. In field trials 76G1-322, FL-1, MomFrr 25, MomFrr 33, FRT 3, and 'Silvana' were least damaged. *Perennial ryegrass*- In field trials 'Manhattan', 'Pennfine' and 'Score' were least damaged.
Southern Chinch Bug	*St. Augustinegrass*- 'Floratam' and 'Floralawn' are resistant cultivars. 'Floralawn' is a new cultivar soon to be released by the Florida Agricultural Experiment Station. A third cultivar, 'Floratine' demonstrates a moderte level of tolerance.
Greenbug	*Kentucky Bluegrass*- No resistant cultivars released. Good progress has been made in selecting for resistance in adapted cultivars. Resistant germplasm is under development.
Sod Webworm	*Kentucky Bluegrass*- No resistant cultivars released. Kentucky-grown 'Kentucky Common' reported to be less damaged by Crambus species. *Bermudagrass*- No resistant cultivars released. Differences in response of tropical sod webworm (Herpetogramma phaeopteralis Guenee) and grass webworm (H. licarsisalis Walker) reported on strains and some cultivars. 'Common' and 'Tifway' showed the least feeding damage by grass webworm.'Common' and FB-119 showed more tolerance to tropical sod webworm than 'Tifway' and 'Tifgreen'. *St. Augustinegrass*- 'Roselawn' reported as less preferred by tropical sod webworm than 'Bitter Blue', 'Scotts 1081', 'Florida Common' and three Florida accessions. *Perennial ryegrass*- Endophyte-induced resistance to complex of Crambus species in 'Pennant' and 'Repell'.
Mole Crickets	*Bermudagrass and Bahiagrass*- No resistant cultivars released. Some genotypes have shown little reduction in root and shoot growth after several months of exposure to mole crickets which severely damaged 'Tifway' and 'Tifgreen'.
Banks Grass Mite	*Zoysiagrass*- No resistant cultivars. A genotype of Zoysia tenuifolia was reported as highly resistant.
Bermudagrass Stunt Mite	*Bermudagrass*- FB-119 (Franklin), a medium-to-coarse textured bermudagrass cultivar, is highly resistant.

the turf roots immediately.

From late June to mid-July, symptoms of injury include wilting in spite of irrigation. In July, larvae move deep into the soil, pupate and emerge as adults. These adults lay eggs during August producing a second generation in states such as Ohio. The second generation larvae are capable of damaging turf.

If preventative applications of insecticde were not made, existing infestations may be spot or generally treated with Proxol, Turcam, diazinon, or Mocap at label rates.

Sod webworms—Damage from sod webworm larvae occurs occasionally in most of the cool-season turf region. Injury is more common in midwestern states and is usually seen in July and August. Older sod fields and heavily thatched turfs are good candidates for infestation. There are generally one or two generations per year, depending upon the species.

In warm season areas most sod webworms complete at least three generations a year, with overlapping generations toward the end of the season.

Damage is most severe from late June through August. In southern Florida where the tropical sod webworm is active throughout the year, damage is most severe in late summer and fall.

Hybrid bermudagrasses are favored by sod webworms, but damage occurs on other warm season grasses. Webworm damage to bermudagrass often superficially resembles symptoms of some diseases. Flushes of soapy water can be used to determine the presence of sod webworm larvae.

Insecticide applications should be made when larvae are present and/or one to two weeks after peak moth flight.

Formulations of Dursban, diazinon, Sevin, Proxol, or Aspon applied at labelled rates provide control. Retreatment may be necessary depending upon the location and number of generations.

Cutworms—Cutworm larvae continue to cause visible damage to golf course greens through June. These larvae pupate in the soil or thatch and emerge as moths that lay eggs for additional generations.

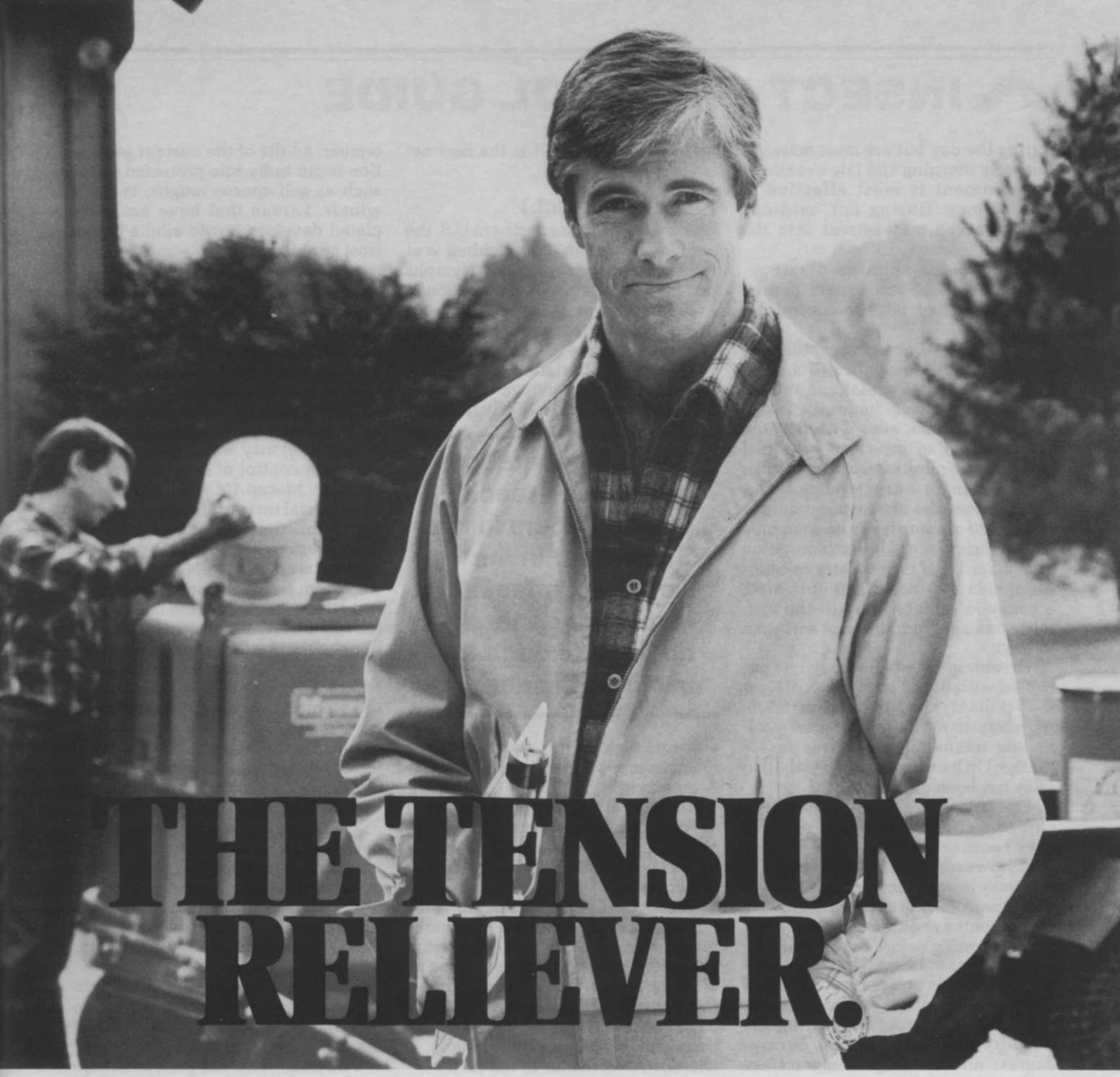
Cutworm larvae can be controlled with a wide range of insecticides at label rates; including Dursban, Proxol, Aspon, Sevin, and others. Irrigation following liquid applications is generally not advisable.

Fall armyworm—The fall armyworm is seldom a problem of cool-season turf.

But in the South, summer always means the arrival of the moths of this migratory pest. Although in mild winters fall armyworms may overwinter along the Gulf Coast, it is generally believed that the moths are blown in on winds from Central and South America. Several generations occur each season, one about every five weeks. Generations overlap in the fall.

Lush, green bermudagrasses are preferred. By late June, fall armyworm damage to turf has usually been reported along the Gulf Coast. Damage is seldom permanent, unless drought and/or heat stress follow.

Fall armyworms may feed anytime



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during the day but are most active in the early morning and late evening.

Treatment is most effective at these times. During hot, mid-day hours, larvae may retreat into the thatch.

Insecticides such as diazinon, Sevin, Dursban, and Proxol can be used at labelled rates to control fall armyworm.

Greenbug—Damaging populations of greenbug can occur from June through August. Populations and incidents of damage freqently varies from area to area, even within a city.

Symptoms of injury include turf under the dripline of trees and in open areas having a burnt orange color. When symptoms are seen, numerous aphids (40 or more) may be seen on a single grass blade. Close examination of damaged turf is necessary because the aphids are small. If left untreated, a heavy infestation can kill the turf. Little damage from this pest was seen in 1983.

Greenbug infestation may be controlled with liquid treatments of Dursban (1 lb. AI/acre) or diazinon (2.5 lb. AI/acre). If reinfestation occurs following treatment with these insecticides, Orthene (acephate) at labelled rates has been effective.

Fire ants—Fire ants are more difficult to control during hot, summer days because they are deeper in the soil. However, during rainy periods, they may become active and establish new mounds. Treatments during these months should be applied early in the morning before the heat of day.

Scale insects—Although Rhodesgrass scale is present in Gulf Coast areas throughout the year, damage becomes most pronounced during the hot, dry days of summer. Bermudagrass and St. Augustinegrass are preferred hosts, but other grasses are also infested. Several treatments with diazinon and a wetting agent are required for control to be effective.

Ground pearls are scale insects that live in the soil throughout the year, sometimes 8-10 inches deep. In the spring eggs hatch producing nymphs. The nymphs feed throughout the summer by piercing turf roots and extracting plant fluids.

Chemical control has not been effective for ground pearls at any time of year. Damage is most severe during summer months when the turf is stressed from heat and drought.

Centipedegrass is especially susceptible to damage, particularly when weakened by overfertilization or drought. Proper fertilization, disease control, and adequate irrigation to maintain healthy turf is the best defense.

FALL (Sept.-Oct.)

Chinchbugs—In the northern U.S. the second generation of chinchbug is at peak numbers in September. Nymphs complete their development to adults in late October. Most chinchbugs overwinter in the turf, but some move to protected areas before winter.

Generally, infestation levels at this time are not high enough to warrant the use of insecticides. Early fall rains and infection by a parasitic fungus (*Beauveria* spp.) usually provides sufficient control.

Second generation chinchbugs reach peak numbers in late September in the North, but infestation levels are generally not high enough to use insecticides.

Damage by southern chinchbug may continue in untreated areas. Late summer applications of insecticide usually make fall treatment unnecessary.

Billbugs—During September billbug adults that developed from summer larvae are often seen wandering about on sidewalks, driveways, or other paved surfaces. Before winter, these adults seek shelter in thatch, along sidewalk edges, or near foundations and overwinter there. Many, if not most, overwinter in the turf.

Grubs—Most species of grubs are in the third of their three stages of development and are feeding actively. When soil temperatures decrease in late October the larvae burrow deeper into the soil to overwinter. Severely cold winters have little effect on survival.

Treatments of existing grub infestations can be accomplished as late as early to mid-September, using standard grub insecticides and sufficient (½-inch or more) irrigation. Treatment after this time may or may not kill the grubs before they move deeper into the soil to overwinter.

If the soil is dry irrigation before treatment is advisable. Whenever treatment is applied, the grubs should be in the top one to two inches of soil.

Black turfgrass ataenius—By September, adults of the current generation begin to fly into protected areas, such as golf course roughs, to overwinter. Larvae that have not completed development to adults before frost are killed.

Mole crickets—Mole crickets fly again in the fall, but no egg laying is know to occur at this time. The crickets are large and difficult to control at this time. Damage becomes obvious as turf growth slows.

Sprays of diazinon (5-6 lb. AI/acre) or Turcam (2 lb. AI/acre) may have to be repeated several times. Oftanol (2 lb. AI/acre) may work too slowly for adequate control of large crickets in October. Mocap 10G (10 lb. AI/acre, commercial turf only) is usually effective at this time providing up to four weeks residual control.

Sod webworm—Northern sod webworm larvae are small and cause little if any damage in the fall. Late in the fall the larvae construct a cocoon-like shelter in which they overwinter.

Except for the most southern areas where development is continuous, sod webworm larvae present in September will overwinter. Areas treated earlier in the season may be reinfested by this time. Treatment in September reduces the population for next season.

Fall armyworm—Fall attacks on newly established turf from mid-September through October may result in damage that will not recover with fall fertilization. This forces the turf to enter winter in a stressed condition. Such damage can contribute to winter turf mortality.

If needed, apply controls early in the morning or late in the day when fall armyworms are most active. Use diazinon, Sevin, Dursban, or Proxol.

Fire ants—Hot, dry periods in September and October may make fire ant control difficult. Once rain begins, fire ants become active and may be effectively controlled with mound treatments of diazinon, Dursban, Orthene, Amdro® bait or MC-96. Larger infested areas where mound treatment is impractical can be treated with Amedro fire ant bait (1.5 lb./acre).

Greenbug—Severe infestations of greenbug have been known to occur as late as the first week of December. Areas having a history of infestation should be reexamined when mild temperatures extend late into the fall. Heavily infested turf will not survive through winter.

Late fall infestations may be controlled with the same insecticides used to control the pest during the summer.

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Shown above, southern red mite eggs *overwintering on Japanese holly. Above right, are boxwood leafminer adults. These emerge in April, a good time to spray. Immediately right is an Eastern Spruce Gall Adelgid with eggs.*

Woody Ornamental Insect Control

by **Dr. D. G. Nielsen**, professor of entomology, Ohio State University, Wooster, OH and **Dr. J. R. Baker**, extension entomologist, North Carolina State University, Raleigh, NC

Landscape trees and shrubs constitute a major investment and add significantly to the beauty and value of residential and commercial properties. Landscape managers need to be familiar with woody plants, their requirements for survival and vitality, and their pest problems to implement effective insect control programs.

Most native trees and shrubs on undisturbed sites suffer only rarely from ravages of insect pests. However, trees growing in landscapes are commonly stressed by lack of water (or too much water if there is poor drainage), high temperatures, compacted soils, and other factors that reduce the tree's ability to either repel or withstand insect attack without suffering decline.

Most major pests of trees and shrubs are probably opportunists that exploit hosts that have been altered by their physical environment.

Landscape managers can take advantage of the information in this article to develop strategies for controlling insect pests of woody plants. The information is organized according to seasonal insect activity. The time or times an insect is vulnerable to a direct control tactic and up-to-date insect control recommendations are provided.

Control strategies

In the past, cover sprays were often used to control any insect pests that may be present on the property, because the detrimental side effects of some pesticides were not yet known and landscape managers were not familiar enough with local pests to develop target spray programs. Many times, all trees on a property were sprayed when only a few of them harbored pest species.

Today, conscientious tree care specialists use insecticidal sprays only after determining which pest(s) is present, whether or not it has reached a potentially damaging population level, and spot-spraying only infested plants. This approach is cost effective in terms of landscape beauty and longevity and environmental quality.

Dormant period (November-March)

Some insect and mite pests are vulnerable to control tactics after trees and shrubs have become acclimated to winter temperatures.

In the South, woody ornamentals may not become dormant until late December. Landscape managers can capitalize on this vulnerability by conducting pest control activities when other maintenance activities are not competing for their time.

Horticultural spray oils can be used safely on many woody plants to control overwintering eggs of spider mites and aphids and immature forms of adelgids and soft scales.

New information from Cornell University indicates that currently available horticultural oils can be used throughout the year when the temperature is above freezing. However, four cautions should be considered before using these products:

1 read the label to make sure the product is not phytotoxic to plants on which you intend to use it;

2 do not use oils at the dormant season rate in the fall before plants have become winter-hardy;

3 oil sprays should not be used on plants under moisture stress or when temperatures are high with high humidity;

4 do not apply oil sprays to tender new growth in spring.

Spruce gall and pine bark adelgids—Adelgids are small, soft bodied insects that commonly cause pineapple-like galls to form on their spruce host(s).

Eastern spruce gall adelgid and Cooley spruce gall adelgid overwinter as young nymphs on the underside of branches on spruce or on the lower leaf surface of Douglas fir, the alternate host of the Cooley gall adelgid. Pine bark adelgid overwinters as eggs, nymphs and adults in bark cracks and crevices on white pine.

Adelgids can be controlled on all hosts any time after spruce galls open in late summer until just prior to bud break the following spring. Horticultural oil may reduce the overwintering population. Sevin (carbaryl) or lindane can also be used in a thorough-coverage, hydraulic spray, making sure to cover the underside of spruce branches and Douglas fir needles. A wetting agent may be useful to help penetrate the fluffy wax covering on the insect, especially for the pine bark adelgid.

Spider Mites—Spider mites, including spruce spider mite on coniferous evergreens and southern red mites on broadleaf evergreens, suck plant juices and deposit silk and waste material on their hosts, causing foliage to become dull and bronze colored.

These mites tend to feed in spring and fall but usually die out in very hot or very cold weather. They overwinter in the egg stage which is susceptible to control with horticultural oil.

Aphids—Aphids are small, soft-bodied insects that insert their mouthparts into the phloem of leaves and stems to suck out sap. Aphids excrete honeydew, a sweet liquid which coats infested plants when they feed in groups of large numbers.

Some species (melon aphid, apple aphid) feed on the most succulent part of the plant. Other species (giant willow aphid, giant bark aphid, *Cinara* aphids) feed on stems.

High aphid populations can cause leaves to yellow and fall prematurely.

Honeydew they excrete serves as a substrate for a black sooty mold fungus that reduces the aesthetic appeal of the plant and reduces its ability to manufacture food.

Many aphids overwinter as exposed eggs on conifer needles or on stems and buds of other woody plants. If a damaging aphid population was detected the previous summer or fall, an application of horticultural oil before bud break will reduce the spring aphid population, thereby giving the tree a chance to recover before aphids build-up again during the spring and summer.

Soft Scales—Soft scales are another kind of sucking insect that hurts a tree's vitality by removing energy and reducing the tree's ability to manufacture food. They also suck sap from the phloem and produce honeydew; some of them seriously weaken or kill their hosts. Heavily infested trees and shrubs often become blackened with sooty molds.

Some overwinter as immature forms (cottony maple, cottony maple leaf, magnolia, pine tortoise, and Fletcher scales) that are vulnerable to horticultural oils used at the dormant application rate.

Spring (April-late June)

Most insects become active in the spring, responding to warmer weather and resumption of plant growth and development. Monitoring trees and shrubs during spring is one of the most important tactics in a modern, rational insect control program. Newly expanding or expanded leaves should be checked for the presence of sucking insects, leafminers, and defoliators.

Tree limbs and trunks should be inspected to determine presence of active borer galleries. Early detection will permit time for learning the identity of the pest and determining if a spray program is justified.

Defoliators—Eastern tent caterpillar, fall cankerworm, whitemarked tussock moth, and pine sawflies are among the first defoliators to begin feeding in spring.

Eastern tent caterpillar is obvious and readily detectable because it forms a silken tent in tree crotches, especially flowering fruit and nut trees. During years of high caterpillar numbers, entire trees may be defoliated.

Sawflies are much more difficult to see since they blend in with their pine needle hosts. They often reach maturity before defoliation is noticed.

The tent caterpillars and their relatives, including mimosa webworm, fall webworm, bagworm, and gypsy moth, are readily controlled with a number of conventional insecticides or with the bacterium, *Bacillus thurengiensis*, commonly known as B.t.

Sawflies are related to bees and wasps and are highly susceptible to Sevin. Orthene (acephate) is also labeled for this use.

Elm leaf beetle larvae and adults consume foliage. There are two generations each summer. Sevin, Orthene, or Turcam/Dycarb (bendiocarb) can be used when trees leaf out in spring. A second generation may require a second application in July.

Spider mites are most common and damaging on plants under water stress and during droughts. They complete many generations throughout the summer.

Armored Scales—Armored scales are soft-bodied sucking insects that suck juices from leaves and stems but do not produce honeydew. They are called armored scales because after the first stage molts, later stages are covered by cast skins and tough wax. Consequently, armored scales are vulnerable to contact insecticides only during the crawler and settled first nymph stages.

Armored scales overwinter as eggs (pine needle scale, oystershell scale), as mated females (euonymus and white peach scales), or in more than one stage (hemlock and tea scales). As indicated, all of them are most easily controlled with crawler sprays.

Species that overwinter as eggs can usually be controlled with a single application of an insecticide, if thorough coverage is achieved. If timing of the application is not precise, a systemic insecticide like Metasystox-R (oxydemetonmethyl) or Orthene should be used.

Species like euonymus scale require more than one crawler spray, since the first hatching crawlers molt before the last spring generation eggs are laid. Three thorough-coverage, hydraulic sprays at 10 to 14 day intervals are needed to provide an adequate level of control.

All armored scales having more than one generation per year (pine needle, euonymus and white peach scales) should always be controlled during the spring crawler hatch. This is because the hatching period is shorter at that time, so fewer sprays are required to provide control.

Horticultural oils are effective for armored scale control, but use the summer rate only after new plant growth has emerged and hardened off a little.

Aphids—Aphid populations can explode in a short time, since a new generation can be produced every 10 to 15 days in the North and even faster in the South.

In the North, aphids are often at high population density during summer droughts, or just after a drought period, and should be controlled before they cause premature leaf drop.

In the South, aphid populations are often high in early spring before lady beetles and other predators become active. However, crape myrtle aphid populations often become damaging later the growing season.

Mistblower application is excellent against free-living aphids.

Adelgids—Remember, overwintering forms can be controlled by using a hydraulic application of lindane or Sevin, stressing coverage to the underside of branches and leaves, before bud break. After bud break, adelgids on spruce are protected as their galls form. They become vulnerable again in fall after their galls open.

Leafminers—Birch, boxwood, and holly leafminers are highly specialized insects that in the larval stages damage trees and shrubs by destroying tissue within the leaf.

Birch leafminer is a sawfly (closely related to bees and wasps) that emerges as adults in May. Foliage can be protected by spraying when the adult sawflies are actively mating and feeding on birch trees. Sevin, malathion, and lindane are effective before eggs are laid within leaf tissue.

After egg laying has begun or mines have begun to form, a systemic insecticide should be used. Metasystox-R, Orthene, and Cygon (dimethoate) are labeled for this use.

There are several generations per year, but the first two generations seem to be most destructive.

Holly leafminer is a true fly that has only one generation per year. Spring application of Metasystox-R or Orthene after the new plant growth has hardened off is necessary

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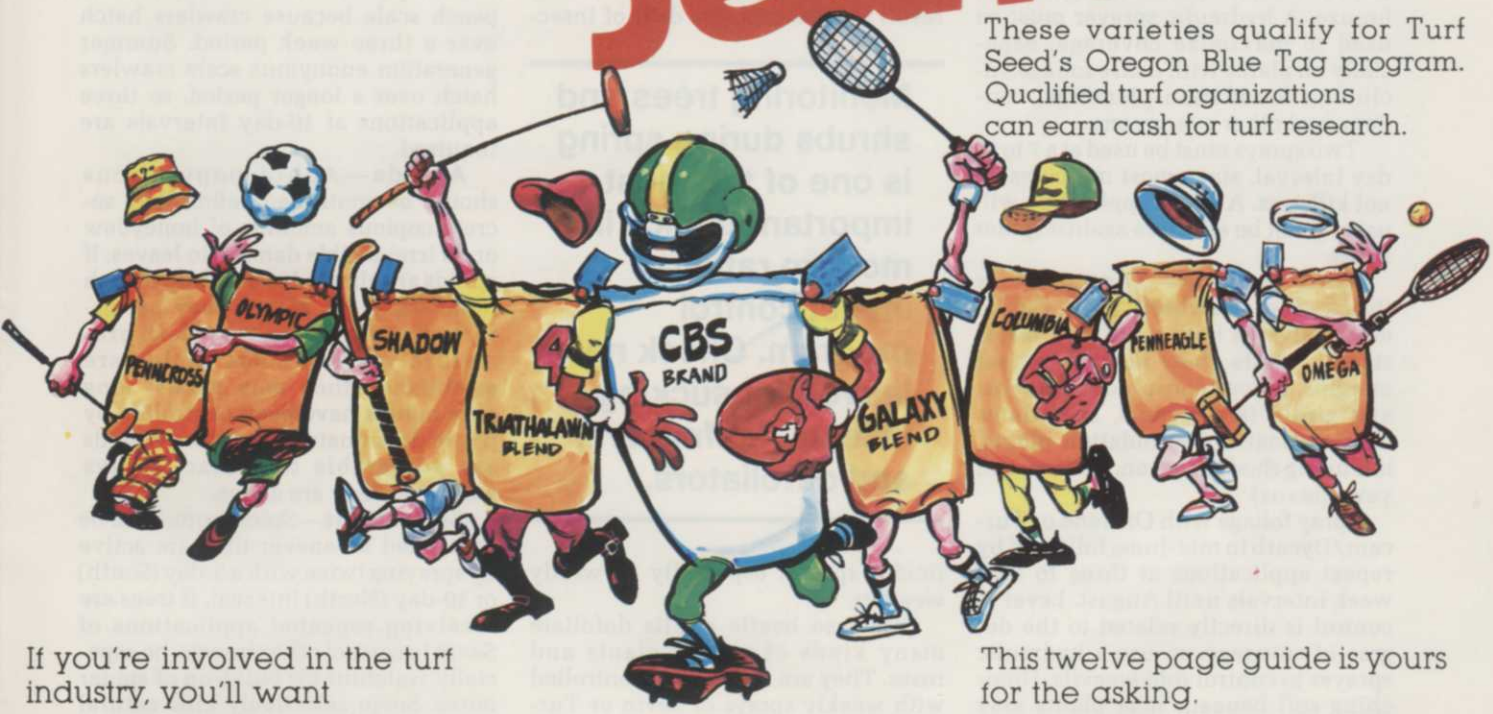

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to achieve control.

Boxwood leafminer is a gall midge which also has one generation per year. A mid to late spring application of Cygon will adequately control boxwood leafminer.

Spider Mites—Spider mites are also most common and damaging on plants under water stress and during droughts. They complete many generations throughout the summer.

Kelthane (dicofol), Mavrik (fluvalinate), or another miticide should be used before mites cause foliage to turn bronze. A hydraulic sprayer must be used to maximize coverage, especially on plants with dense foliage, including foundation plantings, conifers, and other evergreens.

Two sprays must be used at a 7 to 10 day interval, since most miticides do not kill eggs. A single application will usually not be effective against spider mites.

Root Weevils—Root weevils (black vine, strawberry root), can be destructive in both adult and larval stages. Adults chew notches in leaf margins. Larvae consume small roots and girdle larger roots, sometimes causing death of foundation plants, including rhododendron, azaleas, and yews (taxus).

Spray foliage with Orthene or Turcam/Dycarb in mid-June, followed by repeat applications at three to four week intervals until August. Level of control is directly related to the degree of coverage, so use a hydraulic sprayer to control root weevils. Drenching soil beneath host plants may help reduce larval populations.

Borers—Clearwing moth borers are common in lilac, ash, dogwood, rhododendron, oak, and flowering cherries. Flatheaded borers (adults are called metallic wood borers) are common in white-barked birches, oaks, and other stressed hardwoods.

Larvae do the damage by feeding beneath bark, disrupting movement of food and water, destroying the cambium (the growth layer of cells), and causing structural weakness. Clearwing presence and flight periods can be monitored with pheromone traps.

A single, thorough-coverage bark spray of Dursban (chlorpyrifos) or lindane, 10 to 14 days after first male moth capture, will provide season-long control of most clearwing moths. Three applications of bark/foliage sprays with Turcam/Dycarb, Dursban, or Lindane are required to control flatheaded borers.

Summer (July-September)

Defoliators—Mimosa webworm, bagworm, fall webworm, Japanese beetle adults, and second generation elm leaf beetles sometimes become common in early summer.

All of these pests should be controlled when larvae are small to minimize damage and maximize effectiveness of the insecticide. Caterpillars can be controlled with one of the B.t. formulations. Sevin, Orthene, Turcam/Dycarb, and several other common insecticides will also control these pests. Mistblower application may be most cost-effective but may result in unacceptable drift of insecticidal sprays, especially in windy weather.

Monitoring trees and shrubs during spring is one of the most important tactics in a modern rational insect control program. Check new leaves for sucking insects, leafminers, and defoliators.

Japanese beetle adults defoliate many kinds of woody plants and roses. They are most easily controlled with weekly sprays of Sevin or Turcam/Dycarb. Japanese beetle traps can be used to capture large numbers of beetles, but they do not reduce defoliation or control the beetle population. Grub control is much more effective for reducing numbers of Japanese beetle adults.

Second generation elm leaf beetles can cause significant defoliation if heavily infested trees are not sprayed.

Birch leafminer can be controlled, if trees are sprayed when second or third generation adults are mating and ovipositing.

Scales—Crawlers of several soft scales (Fletcher, cottony maple, cottony maple leaf, pine tortoise, wax and tulip tree) hatch in late June or early July (earlier in the South). crawlers and settled nymphs are susceptible to scalicides (Sevin, Orthene, Diazinon, Dursban, and Turcam/Dycarb) in early July. A single, thorough-coverage, hydraulic spray should provide control.

Settled nymphs and other nymphal stages are vulnerable to contact insecticides, because they are not protected by cast skins. Sprays to control soft scales should always be applied after all eggs have hatched to minimize the impact of pesticides on lady beetles and other predaceous insects, to minimize insecticide usage, and to maximize control.

Second generation pine needle scale, euonymus scale, and white peach scale crawlers hatch during July and early August. Two sprays at a 10-day interval may be required to control pine needle scale and white peach scale because crawlers hatch over a three week period. Summer generation euonymus scale crawlers hatch over a longer period, so three applications at 10-day intervals are required.

Aphids—Aphid populations should be controlled before they secrete copious amounts of honeydew or do irreversible damage to leaves. If aphids are allowed to build-up in high numbers, plant growth may be distorted and leaves may fall prematurely. Once sooty molds are established they may persist long after aphids have been controlled by pesticides or natural enemies. Aphids are vulnerable to contact sprays whenever they are active.

Spider Mites—Spider mites can be controlled whenever they are active by spraying twice with a 5-day (South) or 10-day (North) interval. If trees are receiving repeated applications of Sevin to control other insects, be especially watchful for build-up of spider mites. Sevin selectively kills natural enemies of mites, thereby contributing to increases in spider mite populations.

Root Weevils—The second and third applications of black vine weevil adulticides should be applied in July and August. In the South, Japanese weevils and Fuller rose beetles can be controlled with Orthene as a spray and drench during July. A single spring application will not control black vine weevils or other weevils mentioned earlier.

Borers—White-barked birches determined to be infested by bronze birch borer during the summer can be injected with Inject-A-Cide B (Bidrin) using microinjection procedures developed by the J. J. Mauget Company. Injection must be done by a skilled technician in early July or early August.

Infested trees should be watered weekly during summer and fall drought and fertilized in the fall after the first hard frost. The following year, bark/foliage sprays should be

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Insecticide Directory

Common Name	Brand Name	Company	Circle No.
acephate	Orthene	Ortho/Chevron	250
aspon	Aspon	Stauffer	251
Bt	Thuricide Dipel SOK Bt	Sandoz Abbot Labs Tuco/Upjohn	252 253 254
bendiocarb	Turcam	Nor-Am	255
carbaryl	Sevin	Union Carbide	256
chlorpyrifos	Dursban	Dow	257
diazinon	Diazinon Sarolex	Ciba Geigy	258
dicofol	Kelthane	Rohm and Haas	259
dicrotophos	Bidrin	Shell	260
dimethoate	Cygon	American Cyanamid	261
dinocap	Karathane	Rohm and Haas	262
dioxathion	Deltic	Nor-Am	263
dymet	Dymet	Mallinckrodt	264
ethoprop	Mocap Nematicide/ Insecticide	Rhone Poulenc O.M. Scott	265 266
fenamiphos	Nemacur	Mobay	267
femobutatin-oxide	Vendex	Shell	268
fenvalarate	Pydrin	Shell	269
isofenphos	Oftanol	Mobay	270
malathion	Malathion	American Cyanamid	271
methiocarb	Mesurol	Mobay	272
methomyl	Nudrin Lannate	Shell Du Pont	273 274
methoxychlor	Marlate	Kincaid	275
naled	Dibrom	Chevron	276
oxydemeton-methyl	Metasystox	Mobay	277
phosmet	Imidan	Stauffer	279
oxythioquinox	Imidan	Stauffer	279
propoxur	Baygon	Mobay	280
trichlorfon	Dylox Proxol	Mobay TUCO/Upjohn	281 282

mented as indicated earlier. Injection should not be used as an annual, preventive tactic.

Peachtree borer can be controlled with a single application of Dursban or Lindane in early July (in the North, late August in the South). The second application for control of lesser peach tree borer should also be applied at this time to infested flowering cherries.

Fall (September-October)

Defoliators—Mimosa and fall webworms reach their highest population density and cause most defoliation during late summer and early fall. They should be controlled as soon as first generation larval webs are detected in early summer.

However, both pests are susceptible to larvicides in late August and early September. If B.t. is to be used, it must be applied when larvae are small to achieve an acceptable level of control.

Scales—Magnolia scale crawlers hatch and tulip tree scales are born in late August and early September. Infested magnolias should be sprayed when goldenrod is in full bloom (early September). A single, thorough coverage, hydraulic spray with Orthene or Sevin will provide excellent control. Magnolias and tulip trees may be killed by heavy infestations of these scales.

Gall Adelgids—Galls on spruce caused by eastern and Cooley spruce gall adelgids turn brown and open in August and September. After galls open, adelgids are vulnerable to contact insecticides. Remember, adelgids on spruce, Douglas fir, and pine remain vulnerable to insecticidal sprays until the following spring when new buds open.

Root Weevils—Attempts to control root weevil larvae should be made in early September and early October. Two drenches with Turcam/Dycarb have been effective against larvae established in soil surrounding roots of field plants. A single drench with Turcam/Dycarb, Orthene, or Furadan (carbofuran) controls larvae infesting containerized plants. Recent evidence indicates that overwintered larvae may also be susceptible to drenches in early spring.

Closing thought

Throughout this article we have stressed the importance of proper timing and thorough coverage for achieving a high level of insect control. Coverage and timing are often more important than the insecticide or miticide used. So, make sure of proper pest identification, determine when it is most vulnerable to control, and apply a pesticidal spray thoroughly to only infested trees following label directions.

All conventional insecticides are poisons, but they can be used safely and effectively by well-informed practitioners. **WT&T**

FOOTNOTE

1—Insecticides labeled for use against pests mentioned in this article are listed in two Extension Service Publications. The first is "Insect and Mite Control on Woody ornamentals and Selected Perennials," Ohio Cooperative Extension Service Bulletin #504. This manual is available for $3.50 from Extension Publications Office, The Ohio State University, 2120 Fyffe Road, Columbus, OH 43210-1099. The second publication is the "1985 North Carolina Agricultural Chemicals Manual" which is available for $7.50 from Agricultural Communications, Box 7603, Raleigh, North Carolina 27695-7603.

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B6200	15	3	Standard or Hydrostatic
B7200	17	3	
B8200	19	3	
	PTO HP*		
L245 HC	21	3	Standard
L2250	21	3	Mechanical shuttle-shift (8x7)
L2550	23.5	3	Mechanical shuttle-shift (8x7)
L2850	27	4	Mechanical shuttle-shift (8x7)
L345	29	4	Standard
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PROBLEM SOLVERS

by **Balakrishna Rao**, Ph.D.

Help for white ash

Problem: *I have a forty-foot white ash in my front yard. For the last three years, as the leaves develop in the spring, the ends of the leaves will curl up, turn brown and then completely fall off. New leaves then form. This year, the process has gone on longer than usual and it now covers the entire tree. Inside the fallen leaves where the brown portion is, there seems to be a web and some type of critter. Is the white ash worth saving? Can it be saved? What can I do other than to have an expensive spraying of a tree that size? Please advise of your recommendations. (North Carolina)*

Solution: From the above description of symptoms on ash, it appears that you are dealing with a fungal disease and possibly an insect-related problem. The leaf distortion, discoloration and defoliation you have described appears to be related to a fungal leaf spot or blotch anthracnose disease caused by Gloeosporium sp. This disease is widespread in the United States. Areas of leaves, primarily along the edge, turn brown and premature defoliation can result.

Since the disease was prevalent the past three years, if moist spring conditions occur in your area this year, the disease may reoccur. Therefore, consider applying either zineb or Benlate fungicides starting at bud break, and repeated twice at 7-to 10-day intervals to manage the disease.

If the tree defoliates prematurely, collect and destroy the leaves. This practice is usually sufficient to keep leaf spot disease at a minimum. As far as the possible insect problem, it is difficult to identify the causal insect and give recommendations with the information we have now. Therefore, if it happens again this year, send samples to your local extension agents for proper diagnosis and recommendations.

I do feel that it would be worth saving the ash tree and it can be saved from the above disease. Usually, because of repeated disorder and defoliation, the tree will become weak and begin to decline. Therefore, keep this plant under good care by proper watering and fertilizing as needed by soil testing to improve its vitality.

In addition to the recommended fungicides, spraying should help manage the problem in the future.

Borer control on dogwood

Problem: *We have a problem of controlling borers on dogwood. Would you please give recommendations to control these? (New York)*

Solution: Wherever dogwoods are being grown, borers are usually a major problem. Reports indicate that there are at least seven kinds of borers that can attack dogwoods. The most destructive among these are the flat-headed borer, Chrysobothris femorata, and the dogwood borer, Synanthedon scitula.

To control these, treat the trunk and lower branches with insecticides, such as Dursban, Thiodan or lindane during early May, and repeat applications three times at 3-week intervals. Read the label and follow the directions for best results. Keep the plants under good care by watering and fertilizing as needed to improve vitality.

Don't stress plants

Problem: *Last year, we have treated a number of large commercial sites with Embark growth regulator during early spring. To our surprise, its effect did not last longer than three to four weeks after application. To save time, we have applied Embark along with broadleaf herbicides and fertilizer. Do you think this might have affected the result? What did we do wrong? I'd appreciate your comments. (New York)*

Solution: An application of Embark growth regulator, along with fertilizer and broadleaf herbicides, would be stressful to plants and can affect the result of Embark. Although your approach is good for a time saving purpose, it is usually not done that way. The fertilizer stimulates growth and maintains color, while the growth regulator will do the opposite. Thus, they are working against each other. This would reduce the effectiveness of Embark from six weeks to three weeks.

Ideally, apply fertilizer when the turf is actively growing, wait for two weeks to let the turfgrass grow, then apply Embark to get good results.

Dry lime application best

Problem: *We have a problem of maintaining large trees in a zoo area with low pH soil. Would you please comment on how to apply lime to increase pH in this situation? Can we use liquid lime and inject it around trees? (Missouri)*

Solution: Although not impossible, it would be a difficult job to apply lime around trees. Surface applications of dry formulations of ground agricultural lime and postwatering to move the material would be the best approach. Liquid lime needs good agitation and may require lots of water to get good results. Injecting this around trees is a good idea; however, I am not familiar with any published research on this subject.

Balakrishna Rao is Director of Lawn Care Technical Resources for Davey Tree Expert Co., Kent, OH.

Questions should be mailed to Problem Solver, Weeds Trees & Turf, 7500 Old Oak Boulevard, Cleveland, Ohio 44130. Please allow 2-3 months for an answer to appear in the magazine.

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LANDSCAPE LOG

by the Editorial Advisory Board, *Weeds Trees & Turf* magazine

Healthy Plants' Drought Defense

Northeast Emphasis is clearly on insect and disease control in June. Pythium and summer patch are the primary disease concerns at this time according to Martin Petrovic. Sod webworm and bluegrass billbug are primary insect worries. Regular inspection of turf for damage from these pests is advised to halt destruction early.

Golf greens may require treatment for cutworms says Harry Niemczyk. Other problem insects may be greenbug aphids and chinchbugs.

Crabgrass control may actually include both postemergence and preemergence products in June. Second preemergence herbicide applications are still being made in some areas. Postemergence herbicides are most effective against young crabgrass, so waiting until July to make postemergence treatments may not be the best idea.

Summer fertilization should favor slow release products over quick release. Turf needs to be able to resist and recover from pest damage, but excessively lush turf invites diseases.

Irrigation should be timed for the morning and should be heavy and infrequent rather than light and frequent. Turf pathologist Dr. Joe Vargas is recommending daily, very light mid-day irrigation of disease-prone turf to provide a suitable environment for beneficial organisms in the thatch. Problems with irrigation systems should start to be apparent in June and should be corrected before summer stress increases.

Irrigation controllers *are adjusted to weekly rainfall*

Trees and shrubs also prefer deep watering. Insect-prone shrubs should be watched carefully for infestations of aphids, arbovitae leafminer, birch leafminer, black vine weevil, dogwood borer, cottony maple scale, bronze birch borer, leaf hopper, lilac borer, and wooly peach aphid.

Narrow-leaved evergreens can be pruned in June. Storm damaged plants can be removed and replaced successfully with container-grown plants says Doug Chapman.

Great Plains—Bob Shearman recommends preventative treatments in June for summer patch (*Fusarium blight*), brown patch, and pythium blight. It is also time for second preemergence herbicide treatments and application of insecticides for bluegrass billbug and chinchbug where needed.

Annual flowers can be safely planted in June, rose fungicide sprays should continue, and insecticides used to control lilac borers, bagworms, and honeysuckle aphids.

Trees should be inspected and treated for elm leaf beetle, peach tree borer, sawflies, and bronze birch borer. Junipers may be treated with benomyl to control *Phomopsis* and with copper fungicides to control *Cercospora* twig blight. Pines may be sprayed with copper fungicides for needle blight.

Mid-Atlantic—Jack Hall recommends fertilization, aerification, verticutting, and irrigation of warm-season grasses in June. Sodding and sprigging are safely performed in June.

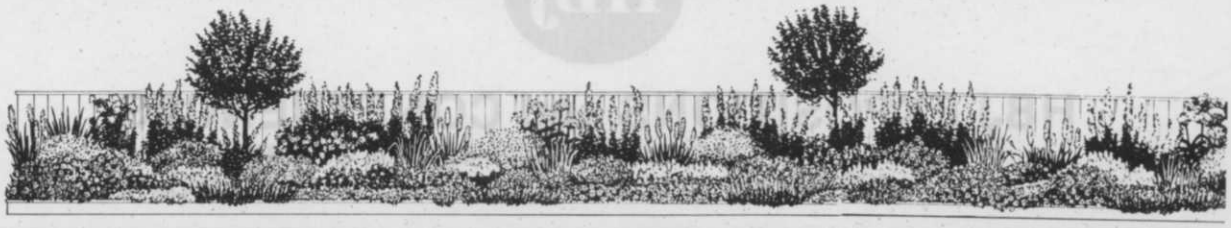
Cool-season turf has the extra worry of leaf spot, brown patch and *Fusarium* diseases in June.

Both cool and warm-season turf should receive application of postemergence herbicides for crabgrass and insecticides for sod webworm, billbug, and chinchbug control. A second, half-rate application of preemergence herbicide may be beneficial if extended summer crabgrass control is needed.

Florida enters the hurricane season in mid-June. Before the rains start, says Bruce Augustin, the soil is dry and irrigation is very important. Chinchbugs may take advantage of this dry, warm period to damage turf. The turf is growing rapidly.

When the rains begin in late June, diseases may become a concern. New plantings of St. Augustine are susceptible to gray leaf spot, and established warm-season grasses may become infected with brown patch and leaf spot. Heavy rainfall in late June may cause rapid leaching of fertilizers from sandy soil making extra fertilizer applications necessary.

Editorial Advisory Board members are: **Bruce J. Augustin**, extension turf and water specialist, University of Florida, Ft. Lauderdale, FL; **Douglas Chapman**, director and horticulturist, Dow Garden, Midland, MI; **Jack Hall**, Virginia Polytechnic Institute and State University, Blacksburg, VA; **Kent Kurtz**, professor, ornamental horticulture, Cal Poly, Pomona, CA; **Harry Niemczyk**, professor of entomology, Ohio State University, Wooster, OH; **Martin Petrovic**, assistant professor of turfgrass science, Cornell University, Ithaca, NY; **Robert Shearman**, associate professor or turf, University of Nebraska, Lincoln, NE



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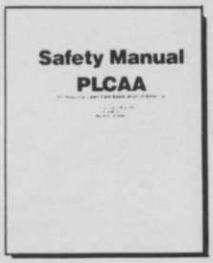

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TOMA SPEAKS *from page 16*

George Toma from the Kansas City Chiefs keynoted the conference. Toma fascinated the crowd with 140 slides of his experiences with both natural and artificial turf. "We face tremendous roadblocks at times." Toma admitted. "Only long hours, creative problem solving, and our crews get us through. We are a family and we have to stick together and grow."

Specialists in drainage, chemicals, soils, and irrigation gave both the basics and their tips to the Institute

Sports Turf Institute '85.

attendees. For four hours speakers shared their experiences so others could learn.

This year's Institute was sponsored by the Sports Turf Manager's Association (STMA), a non-profit professional organization Kurtz serves voluntarily as executive secretary.

"STMA has arranged major regional seminars in 1986 in conjunction with the Golf Course Superintendents Association of America conference in San Francisco and the new Landscape Exposition in Valley Forge, PA," Kurtz said. In addition to the Institute, Kurtz hopes to develop seminars in the Chicago area and in Florida.

STMA has a bimonthly newsletter and a membership binder containing field specifications, membership roster, and product catalog sheets. Dues range from $20 to $100 per year. Interested persons should contact Kent Kurtz, STMA, 1458 N. Euclid, Ontario, CA 91764.

Kurtz is co-authoring a book with Dr. William Daniel on sports turf management to be published in 1986 by Prentice Hall.

TORO *from page 18*

Courtland P. Paul, president of the ASLA, is teaming with Toro's Rick Robins, landscape architects Bob Cloud and Cal Olsen, and university professors John Roberts and Jot Carpenter on an editorial committee.

In a related matter, Toro announces a Landscape Advancement Awards Competition to recognize landscape professionals utilizing innovative irrigation techniques.

Landscape architects, architectural engineers, and other landscape professionals are eligible to compete for one of four $500 cash prizes. Toro says it will contribute a $2,500 donation in each of the winner's names to the endowment fund. The first presentation of these awards will be Oct. 11-15 at the 1985 ASLA show in Cincinnati, OH. Submissions for the 1985 awards will be accepted through July 15.

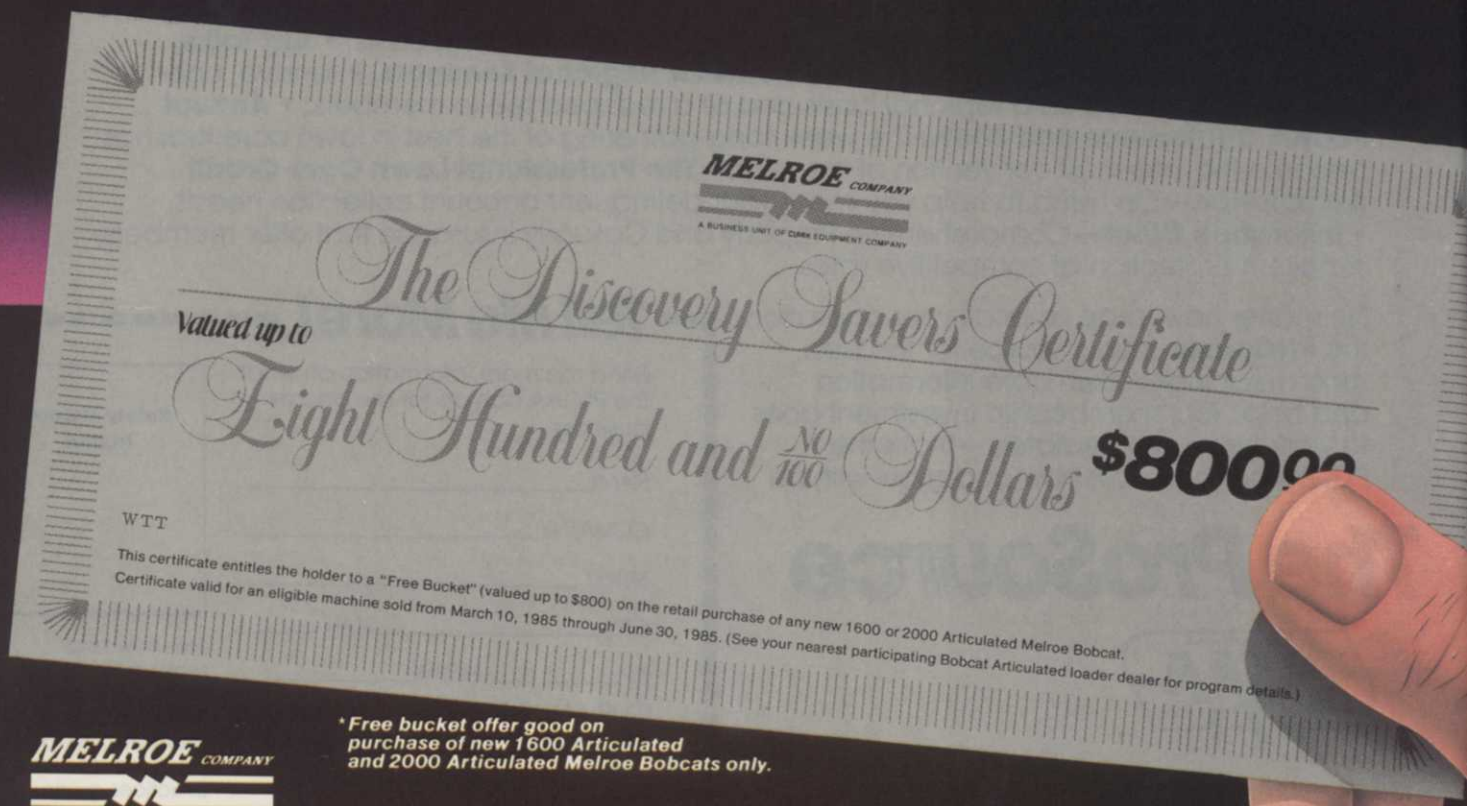
For more information contact Sherry Barndollar, executive director LAF, 1733 Connecticut Ave., Washington, D.C. 20009. (202) 223-6229.

TURFGRASS

Lofts extends Baron contract through 1989

Lofts Inc., Bound Brook, NJ, will continue to be the exclusive U.S. source of Baron Kentucky bluegrass at least through 1989, Jon Loft, president of the company, announces following his recent trip to Holland.

Melroe will give you up to $800* to



*Free bucket offer good on purchase of new 1600 Articulated and 2000 Articulated Melroe Bobcats only.

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Loft and Bert Barenbrug, Arnhem, Holland, extended their Baron contract through the 1989 harvest. Lofts Inc. and Barenbrug entered into their initial agreement almost 15 years ago when Lofts introduced Baron to the U.S. turf market. Baron's U.S. plant patent number expires May 23, 1989.

INDUSTRY

Chipco Ronstar WP registered for turf

Chipco Ronstar WP is now EPA registered for turf, but won't be marketed until 1986 because of the timing of the registration, Rhone-Poulenc Inc. reports.

"We will use 1985 to demonstrate the excellent preemergent weed control of Chipco Ronstar WP to the turf professionals," says Chipco Product Manager Dan Stahl.

Chipco Ronstar WP is a wettable powder formulation of the widely used turf and ornamental pre-emergent herbicide Chipco Ronstar G.

Although the registration for Ronstar WP is for turf only, Stahl reports, "we already have a program for expanding the label and we have put that program into action."

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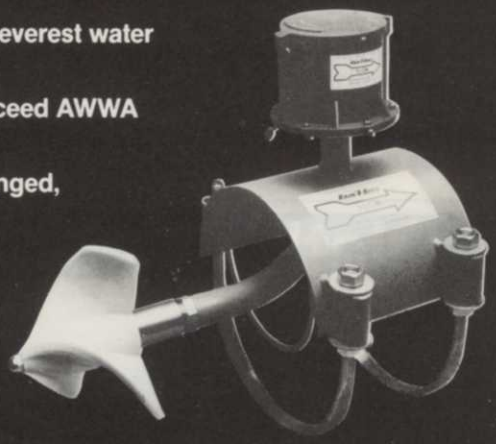

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RESEARCH

Turf ring spot control difficult

The appearance of ring spots in turf still has researchers puzzled, although progress is being made in controlling it, says Dr. Gayle Worf of the University of Wisconsin.

The unpredictable response of ring spot, commonly called Fusarium blight, to traditional treatment is causing researchers to literally put the disease under the microscope.

Worf, who spoke at the recent Reinders Turf and Irrigation Conference near Milwaukee, says control of Fusarium blight is complicated because it appears to be two (or more) diseases with almost identical symptoms. Research points to nectrotic ring spot (NRS) and summer patch as appearing as "twins", Worf notes.

His research in Wisconsin indicates NRS is usually a mid-summer disease that occurs primarily on bluegrass that is two to eight years old. NRS does not appear to be affected by aerification, removal of thatch, or by changing the pH of the soil. Nor does it appear that NRS is caused by the application of herbicides.

Overseeding with perennial ryegrass will give affected turf a more pleasing appearance since NRS attacks bluegrass. But Worf says the best way to battle NRS might be to maintain sensible fertilization and irrigation programs. "Over a period of time, if you can keep the turf alive, the plants are going to heal themselves," he adds.

Some varieties of bluegrass (Adelphi, Majestic, Merion, Midnight, Mystic, Park, Vantage, and Wabash) appear to be more tolerant of NRS than others, his Wisconsin test plots suggest.

INDUSTRY

Scotts starts lawn care division

O.M. Scott & Sons, Inc. has set up a special division for marketing its products to professional lawn care companies.

The new division will be headed by Ron Gagne, a 16-year veteran of Scott's Pro Turf Division.

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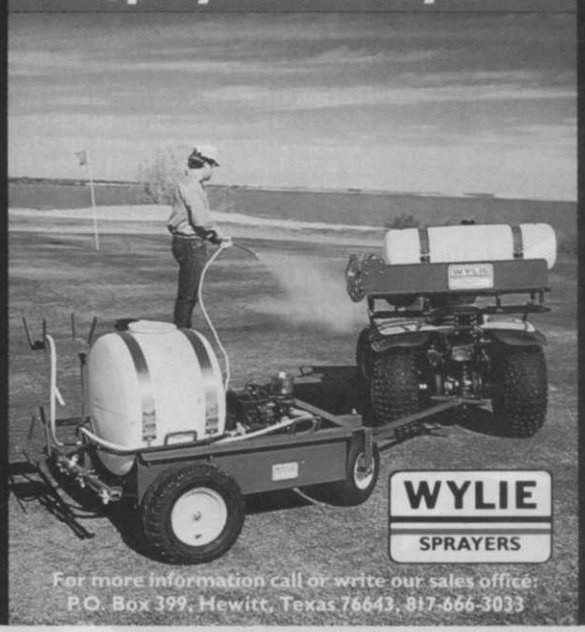

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been getting the attention it should have, mostly because we recruit our sales force from golf courses," says Gagne. "So our strength has been mostly with the golf courses.

"But after the PLCAA in Tampa last November, we decided to reorganize the Pro Turf Division and open a sales force specializing in professional lawn care and to develop a product line especially for that market."

The new division consists of five people, including Gagne. It will be expanded in October.

"Starting in January wasn't real good timing for this season," Gagne admits. "So this is a building year for us, a time that we're using to learn how to better serve the industry."

INDUSTRY

Estech to manufacture IBDU at Alabama site

IB Chemical Company, Bucks, AL, should begin manufacturing IBDU, isobutylidene diurea, for Estech later this year. IBDU, a high nitrogen, slow-release fertilizer, is distributed exclusively in North America by Estech, and is used in the formulation of that company's Par Ex turf fertilizers.

Par Ex Sales Manager Irven Stacy says healthy sales "required the need for (IBDU) production facilities in the U.S."

BUSINESS

New 'custom' lawn care service well received

W.R. Grace & Co. Agricultural Chemicals Group, longtime plant food maker, has apparently found a place in the professional lawn care market. It's one-year-old Wondergro Custom Lawn Service is now established in Southern Indiana.

"We've got plenty to keep us busy," Mike DeGroff, service center manager for the service, tells *Weeds Trees & Turf*. "We'll be expanding into Louisville this year."

Wondergro, based in New Albany, IN, presently employs a staff of six lawn care "specialists," each with a fully equipped service truck. Switchboard operators receive inquiries on several special lines. The service stresses the "custom" nature of its services in a campaign of outdoor, newspaper, radio, and direct mail advertisements.

Grace's entry into the lawn care business was spurred by the success of its line of seasonal lawn care products, Grace officials report.

SEED

Jack Hertwig, 73, dies on assignment

Longtime turf industry representative Jack Hertwig died Feb. 26 in Manama, Bahrein. He was in the Persian Gulf nation as part of a joint American Seed Tradesman Association/Foreign Agricultural Service team of turf experts.

Hertwig was on assignment for International Seeds, Inc., Halsey, OR, at the time of his death. Before joining that company in 1981 as a consultant, he worked 25 years with Germain's Seed, Los Angeles. For many years he headed that company's Golf Course Division.

Hertwig, a longtime member of the Golf Course Superintendents Association of America and Pacific Seedmen's Association, is survived by his wife Barbara, sons Joe and Tom, daughter Kathy, and three grandchildren.

Circle No. 117 on Reader Inquiry Card

Lebanon pin-points markets

The management of Lebanon Chemical—blending input from sales, marketing, and production—recently fashioned a major marketing reorganization to increase its market share in the professional turf and lawn care industry. Spearheading Lebanon's drive to make Lebanon more "market oriented" are: (seated from left), Ed Price, Harry Mathis, and Paul Mengle; (standing) Bill Nist, Randy Rogers, and Charlie Pendlebury. Price and Mathis share reponsibility for the lawn care market; Nist for the private label market as well as expanding market penetration of existing product lines; Pendlebury new product development and cooperative university projects; and Rogers new programs for the golf course market. Lebanon, which has doubled its business in professional turf products since 1981, calls the marketing effort "New Directions '86."

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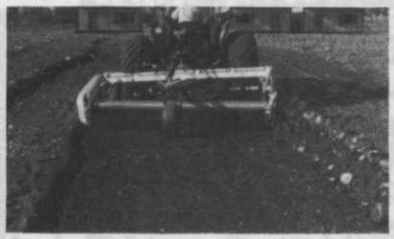

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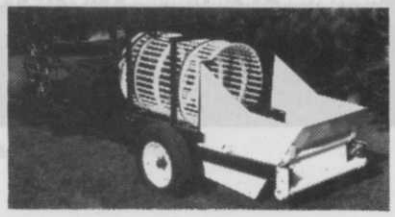

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RANSOMES

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by **Ron Hall,** assistant editor

NY artist creates 'living' sculptures

Hera bends the rules. Of art. Of landscape design. And she gets away with it, to the delight of both herself and a growing number of admirers.

Landscape with a message?

"I call myself an environmental sculptor because my work is large enough to walk around in, but you can still smell the flowers. I want to affect more senses than just the visual," says Hera, who works out of a Manhattan apartment but is represented by work as far away as New Orleans.

Her self-professed goal is to nudge the consciousness of visitors to her gardens toward an understanding of space. Or as Hera (in 1977 she took the name of an ancient goddess of Crete) says: "I want to create a sense of our scale as human beings."

Her creations use predictable landscape plant material in unpredictable designs.

Her latest project, the "Vaulted Arbor" at the Glenwood Houses in Brooklyn, generated conversation in both landscape and art circles in New York at its dedication last fall. She describes it as a "living" sculpture. It is a 22-foot-high, octagonal steel sculpture made of 1¼-inch galvanized steel pipe welded at the intersections and anchored in concrete footings.

Plantings of flowering vines on the structure will give it life, Hera explains. White clematis provides blossoms in spring, golden honeysuckle in summer, blue-purple clematis in fall, and evergreen ivy in winter. "Vaulted Arbor" (43 feet in diameter) could as easily be described as a living sundial. It is laid out in north/south, east/west symmetry.

Hera designs her environmental sculptures for the people who will come in closest contact to them.

"About 80 percent of the people living at Glenwood Houses are elderly and they're very caring people," Hera expains. "They seem delighted with the vegetation. The plants make it easier for them to make contact with the sculpture." Much of the care for "Vaulted Arbor" will be handled by some of these same residents of Glenwood, volunteers, with the help of the Brooklyn Botanic Gardens, which provided financial and technical assistance for its construction.

"Vaulted Arbor" is a departure from her previous work as an environmental sculptor.

In 1980 Hera directed the planting of "Floribunda", a 96-by-69-foot maze of evergreen shrubs and flowering bushes on a prominent traffic island at the Creedmoore Pyschiatric Center, Queens Village, NY. Students from nearby Martin Van Buren High School and the City University of New York helped in the planting of the 300-plus shrubs in what Hera feels is a "huge floral puzzle."

The outside curves contain crimson azalea and purple rododendron. The dead end pockets are darker with inkberry and boxwood plants. Hera wants the maze to create a sense of mystery without being threatening (it's only three feet tall). The message of the living maze, which is best viewed from above, from the cafeteria of the pyschiatric center's main building, should be obvious, the environmental sculptor feels.

Says Hera, "the only true life is outside institutional structures."

The Manhattan-based artist created additional interest in her personalized approach to landscape sculpture with the hedgemaze "Stormflower" in New Orleans, "Snail Shell Maze" in Boxford, MA, and "Bear Paw Maze" in Yonkers, NY.

"Stormflower," installed at the University of New Orleans is perhaps the most colorful. Planted primarily in azaleas, the maze fans out spiral arms to a diameter of 160 feet, representing a hurricane.

Hera's next major project, "Spirit House," should be ready for Laumeier Sculpture Park in St. Louis sometime next year.

"One of the most exciting smells which I can remember is the smell of clean, moist earth which permeated the air of my grandmother's greenhouse," Hera recalls.

"Vaulted Arbor" *in Brooklyn is a 22-foot high "living" sculpture.*

"Stormflower" *in New Orleans is primarily planted in azaleas, providing a maze of color.*

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WTT/LCI

Ford ready with new commercial mower line

Ford is aiming its new line of commercial mowers at lawn service companies, country clubs, golf courses, and other places with big mowing jobs.

Pictured is the C-48 intermediate commercial self-propelled model. Other new offerings include the C-21SP self-propelled and the C-21 push mower.

Circle No. 190 on Reader Inquiry Card

Eaton netting handy for home and garden

Eaton introduces a tough, black polypropylene material, the Home and Garden Netting, designed for a variety of outdoor uses. It can provide protection from birds and animals for fruit trees or as a cover for vegetable and flower gardens. Other suggested uses include composting, erosion control, and winter protection.

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unaffected by chemical sprays, its manufacturer says. The netting is packaged in four lengths: 12 ft., 50 ft., 75 ft., or 100 ft, all being 14 ft. wide.

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1985 Cushman catalog shows mower features

The 1985 catalog for Cushman Front Line mowers features a number of design changes and new model options for the front-mounted rotary mowers.

Gasoline-powered Front Line mowers for 1985 are equipped with a new OMC 22-hp engine which, according to Cushman engineers, delivers 35 percent more power to the cutting deck.

A new 4-wheel version of the Front Line mower will also be available as a factory option this year. A new deck mounting design will allow the interchange of mower decks between gas and diesel powered Front Line models. Steering ratio on both gas and diesel Front Line mowers has been improved by reducing steering effort by 18 percent.

Other 1985 features highlighted in the catalog include a new engine oil cooler, an automatic safety switch that shuts off the engine if the oper-

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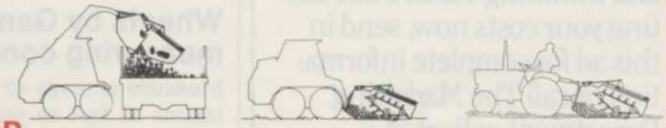

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American Trencher shows new PTO-driven model

The new 3-point-hitch, PTO-driven trencher from American Trencher/Bradco fits many models of small tractors equipped with hydrostatic transmissions or creeper gears.

The trencher features trenching widths from four to 12 inches, and

depths from 2.5 to six feet with dual pivot action. Spoil is handled by the low-horsepower-demand paddle auger or the ribbon, screw type. The drive line is protected by slip clutch while a cat Duocone seal protects the bearings. A one year limited warranty covers the drive line, the manufacturer reports.

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Wheels by Gandy make measuring convenient

Measure acreage or straight-line distances as fast as you can walk with any one of three different measuring wheels being offered by Gandy Company. Two size Gandy wheels mea-

sure in feet, a third in meters.

Gandy says the wheels are handy to measure property lots and cross-terrain distances, determine trenching, cable length, fencing needs, and seeding. The wheels feature quick reset digital counters and detachable sectional handles.

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CAYMAN *from page 37*

these 125 yard "pumpkin balls."

It is the far-flying characteristic of the well struck golf ball that is the lure to golfers. Equipment manufacturers invest millions trying to satisfy this need, and every revolution in golf has centered around making the ball fly further, going from the feathery to the gutta percha ball, from the gutta percha to the wound ball, from hickory to steel-shafted clubs and now it is to space age materials and computer designs.

There is a certain lure to try the short ball alternative to golf for no other reason than curiosity or to become the local resident expert.

Short ball golf is a brilliant publicity ploy for the Grand Cayman Islands and the Britannia resort. Had this short ball thing not become so widely publicized, I don't think many people would travel to Grand (where ?) to play some 9 hole golf course. The concept did what it was supposed to do—make the resort famous. How long this notoriety will last remains to be seen.

Perspective

I hope if this discussion has done one thing it has put the short ball idea into proper perspective.

The whole issue reminds me of the childrens' story about the emperor's new clothes.

As I remember it, there was an emperor who commanded so much influence over his kingdom that when a shyster tailor made the king believe that instead of being nude he was simply wearing the lightest, most comfortable garments in the world, his subjects believed it, too. Then, one day, the emperor was parading in the street showing off his "new clothes," and a little innocent boy called out, "but mother, he doesn't have on any clothes at all."

Of course everyone admitted they couldn't see the clothes either and they all started to laugh at the foolish ruler.

The point is to not blindly believe the emperor, but to put the facts and situation into perspective and believe only what makes sense to you. **WT&T**

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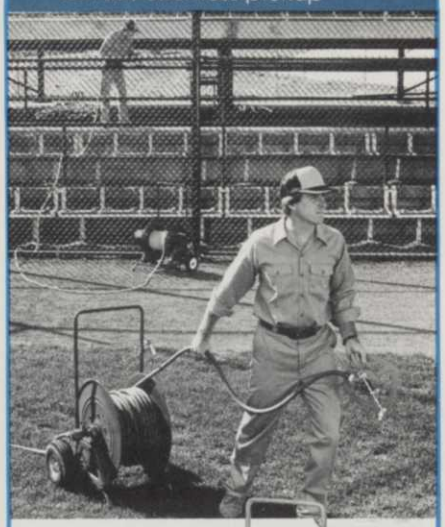

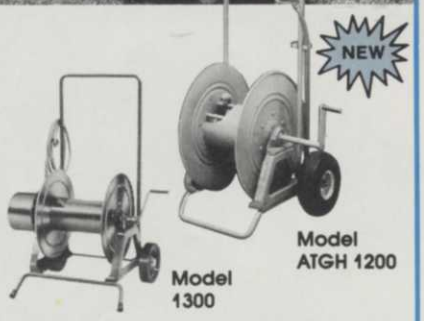

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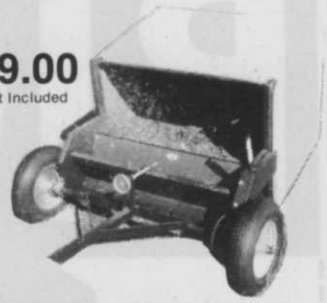

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Fertilizer Institute Marketing Conference, June 9-12, White Sulfur Springs, WV. TFI members only. Contact Pamela Lucas, The Fertilizer Institute, 1015 18th St. NW, Washington D.C. 20036. (202) 861-4900.

Minnesota Green Industry Expo '85, June 19, Anoka, MN. Contact Bob Lund, 5500 International Parkway, New Hope, MN 55428, (612) 533-4823.

University of Massachusetts Turf Field Day, June 26 (rain date June 27), Turfgrass Research Station. Contact Dr. Joseph Troll, Plant & Soil Sciences, Stockbridge Hall Room 10, University of Massachusetts, Amherst, MA 01003. (413) 545-2353.

International Turfgrass Research Conference, June 30-July 5, Avignon, France. Contact International Turfgrass Society, Department of Agronomy, Virginia Tech, Blacksburg, VA 24061.

JULY

Hazard Communication Workshop, July 9-10, Hyatt-Regency, Kansas City. Contact Brenda Dawson, The Fertilizer Institute, 1015 18th St. NW, Washington D.C. 20036. (202) 861-4900.

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OUTLOOK

The roar of the Golden Bear on the quiet island of Cayman

The Golden Bear is making headlines again, not so much with his play but with his ideas on golf course design and golf balls.

His latest is a 20th century application of a not-so-new idea, a lightweight, reduced-distance golf ball. Jack Nicklaus' MacGregor Golf Company poured $100,000 in research and development into a ball that goes half the distance of its traditional counterpart.

The reason for the short ball's celebrity status is Grand Cayman, an island country with limited space for anything, let alone a golf course. Nicklaus was commissioned to design a resort golf course on 38 acres of land. Voila! The short ball made perfect sense.

Nicklaus has maintained from the outset that he's not trying to change the traditional game of golf, only to offer an alternative where land may be at a premium. Side benefits of the game could include an alternative for seniors who find regular courses too strenuous, beginners learning the game, municipalities, schools, office parks, and hotel chains with limited space. The short course could also open up night golf, allow courses to sell a fews acres for needed funds, and reduce property taxes.

Detractors contend the Golden Bear is just trying to add more lustre to his coat; all hale and hearty sentiments about "for the good of golf" conveniently taking a back seat to healthy design fees.

Regardless, it takes guts to be the "first" at anything. Nicklaus' celebrity status, while catapulting whatever he does into the limelight a little quicker, also catapults his mistakes into public scrutiny just as quickly—the bigger they are, the harder they fall.

Where does the superintendent figure into all this? Supposedly, the short course is not as maintenance-intensive as traditional courses. With the ball being lighter, some claim fewer divots will plague the superintendent. With the course being smaller, less equipment will be needed to care for it, less chemicals to keep it green and weed-free.

Other tradeoffs, if the Cayman claims are true, would be increased hordes trampling the same small piece of land and no cart rental fees.

The golfer will decide if what's right for Cayman is right for the rest of Golfdom, or whether the Cayman concept and ball will find the same fate as the Pet Rock.

Maureen Hrehocik

Maureen Hrehocik, managing editor

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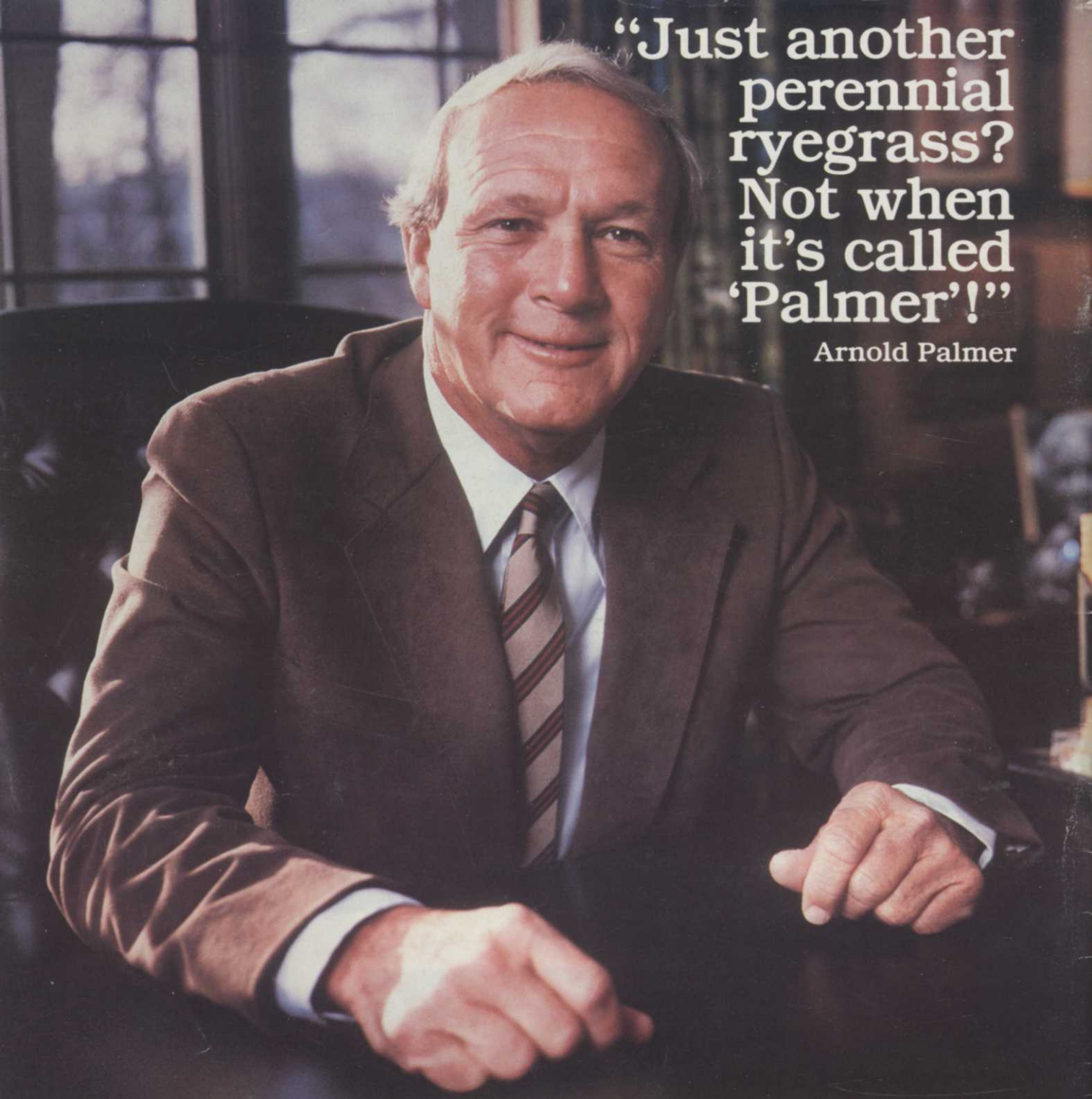

"If a ryegrass is going to be named Palmer, it would have to be very special. And believe me this one is.

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